DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

FIVE DOLLARS PER YEAR

AUGUST, 1956

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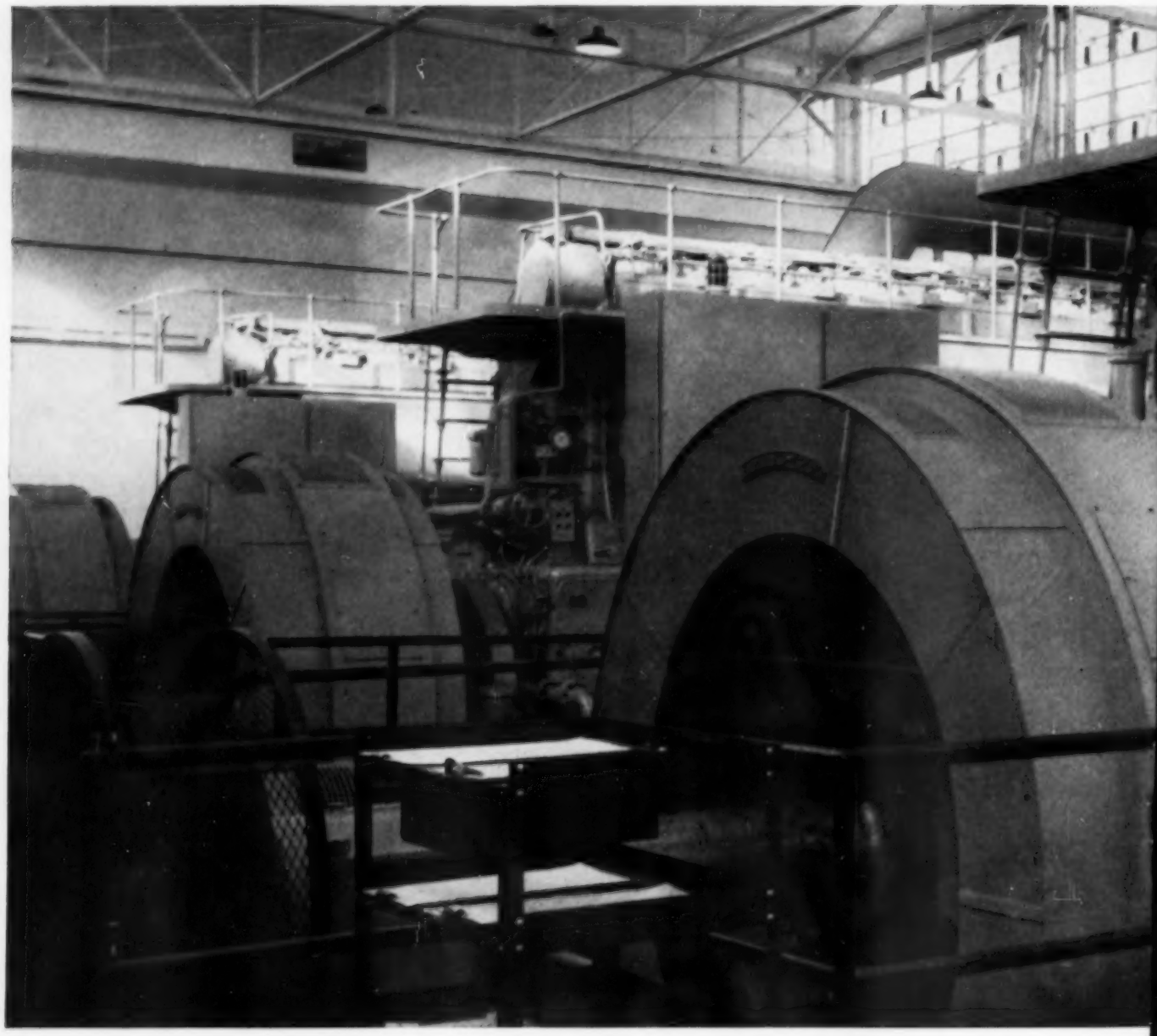

Why TEXACO URSA does a better diesel

ADVANCES in diesel engine design and the imposition of heavier loads have introduced new and complicated lubrication problems. *Texaco Ursa Oil Heavy Duty* is specifically designed to overcome them.

Texaco Ursa Oil Heavy Duty is specially distilled from choice paraffinic stocks, dewaxed and solvent refined to remove gums, tars and oxidation-forming products. Then, this great oil is further improved by effective Texaco additives which:

1. **Inhibit oxidation**
2. **Assure full detergency and dispersion**
3. **Prevent rust**
4. **Protect bearings**
5. **Withstand high pressure and temperatures**

TEXACO

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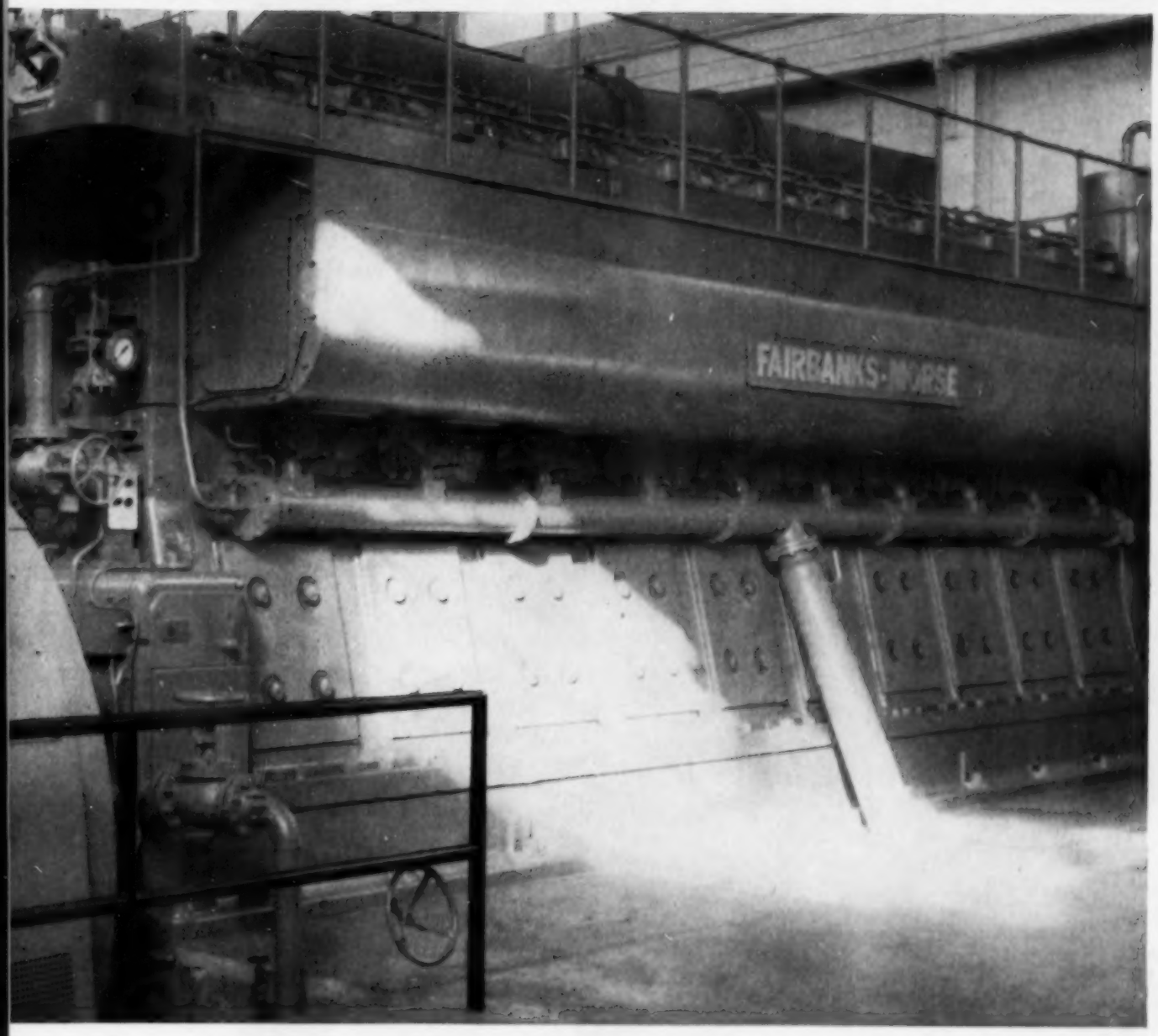


OIL HEAVY DUTY lubricating job...

6. Minimize wear
7. Lower pour point
8. Reduce foaming

Texaco Ursa Oil Heavy Duty thus assures ideal engine cleanliness . . . no harmful deposits, rings always free, dependable action of fuel injectors and pumps . . . resulting in delivery of *more power* with *less fuel* over *longer periods* between overhauls.

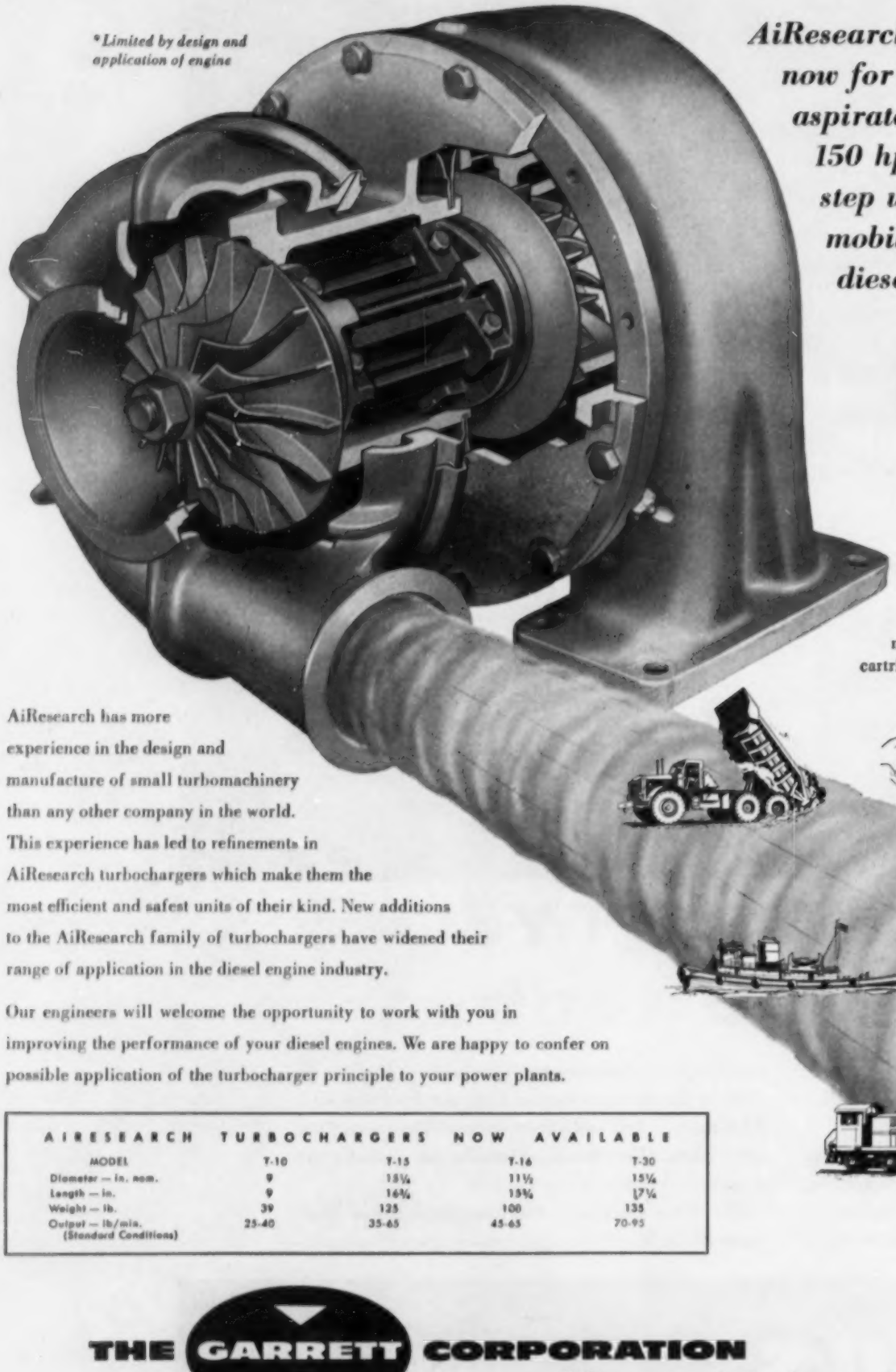
Let a Texaco Lubrication Engineer give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

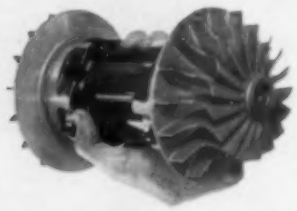
URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

AiResearch Turbochargers improve diesel engine performance up to 100%*

**Limited by design and application of engine*



AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.



Removable cartridge simplifies repair and overhaul

This cartridge contains the turbocharger's rotating assembly, bearings and seals in a factory balanced package. It can be replaced in minutes with another factory balanced cartridge by a mechanic on the scene.

AiResearch has more experience in the design and manufacture of small turbomachinery than any other company in the world. This experience has led to refinements in AiResearch turbochargers which make them the most efficient and safest units of their kind. New additions to the AiResearch family of turbochargers have widened their range of application in the diesel engine industry.

Our engineers will welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on possible application of the turbocharger principle to your power plants.

AIRESEARCH TURBOCHARGERS NOW AVAILABLE				
MODEL	T-10	T-15	T-16	T-30
Diameter — in. nom.	9	13¼	11½	15¼
Length — in.	9	16¾	13¾	17¼
Weight — lb.	39	125	100	135
Output — lb/min. (Standard Conditions)	25-40	35-65	45-65	70-95

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

DIESEL and GAS ENGINE PROGRESS

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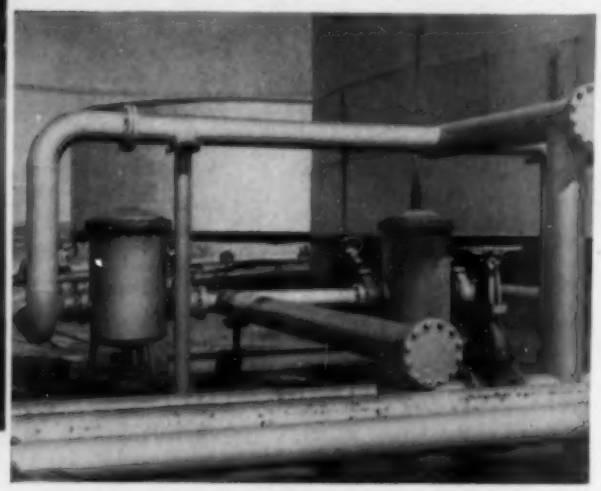
FRONT COVER ILLUSTRATION

One of the 20 new CFI dromedary trucks built by Kenworth for Pacific Intermountain Express. These high capacity trucks are driven by a 250 hp Cummins NHHT turbocharged diesel, which is mounted horizontally about midway beneath the frame of the truck.

at the curb new Purolator dual fuel filter, PAG-25D, has a high flow rate of 25 GPM for diesel fuel combined with virtually no pressure drop. A final assurance to every customer that your product is clean.

or

at the terminal large bulk filtration equipment like this pedestal-type filter (PAG-300L to 1200L) can be used at high flow rates of from 300 to 1200 GPM. Reduces meter wear.



Purolator micronic® fuel filters remove rust

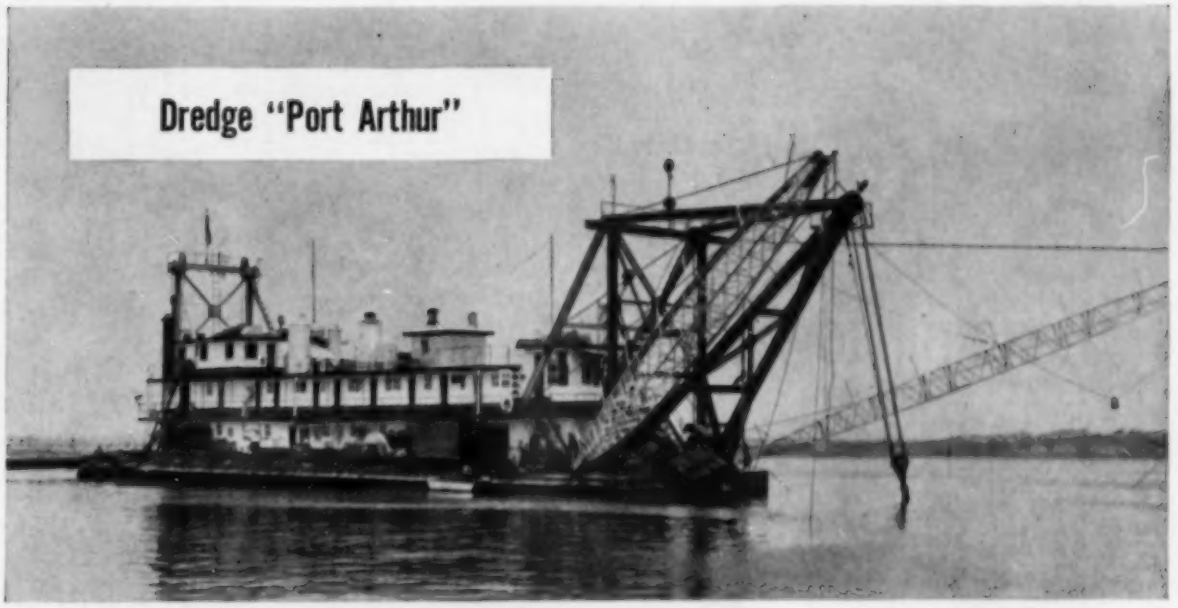
Despite rigid checks which prove the purity of fuel as it leaves the refinery, subsequent corrosion in storage tanks and pipes frequently contaminates it with particles of iron oxide. To remove rust particles, Purolator's engineers have developed the world's finest line of bulk filtration equipment. A recent addition to this line is Purolator's new curb pump filter. It has a filtration area of over 1800 square inches, achieved by 2 resin impregnated micronic fuel filters operating in parallel. Its development helps make certain that wherever you filter diesel fuel or gasoline ...at the curb or at the terminal...you can get precisely the right filter from Purolator.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

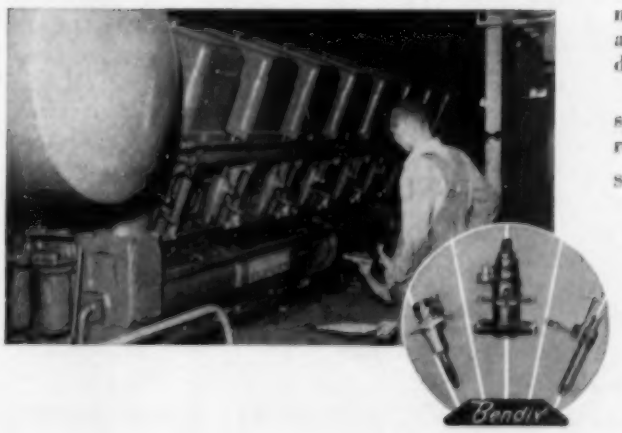
PUROLATOR PRODUCTS, INC., Rahway, N. J., and Toronto, Ontario, Canada

For full details, write Purolator Products, Inc., Front and Linden Streets, Allentown, Pa., Dept. 83-810



75% FUEL SAVING!

NORDBERG 2800-H. P. DIESEL WITH Bendix INJECTION EQUIPMENT



When the sixteen-year-old dredge "Port Arthur" was modernized with the installation of a new 2800-h.p. Nordberg Supairthermal® V type Diesel with Bendix® fuel injection equipment, a number of very amazing results occurred.

During an early major assignment, pumping production was increased 64 percent. Production per gallon of fuel jumped from 7 to 12.3 cu. yds. per gal., a saving of 75.7 percent. In addition, the new 16 cylinder engine supplies 1050 more horsepower at the pump and provides the Port Arthur with a maximum capacity of 50,000 cubic yards per day.

There is no question about it—efficient, new equipment pays off in a big way. And there is no question about the choice of Bendix injection equipment for dependable, economical operation.

That's why so many leading diesel manufacturers specify Bendix for their fuel injection equipment requirements.

®REG. U. S. PAT. OFF.

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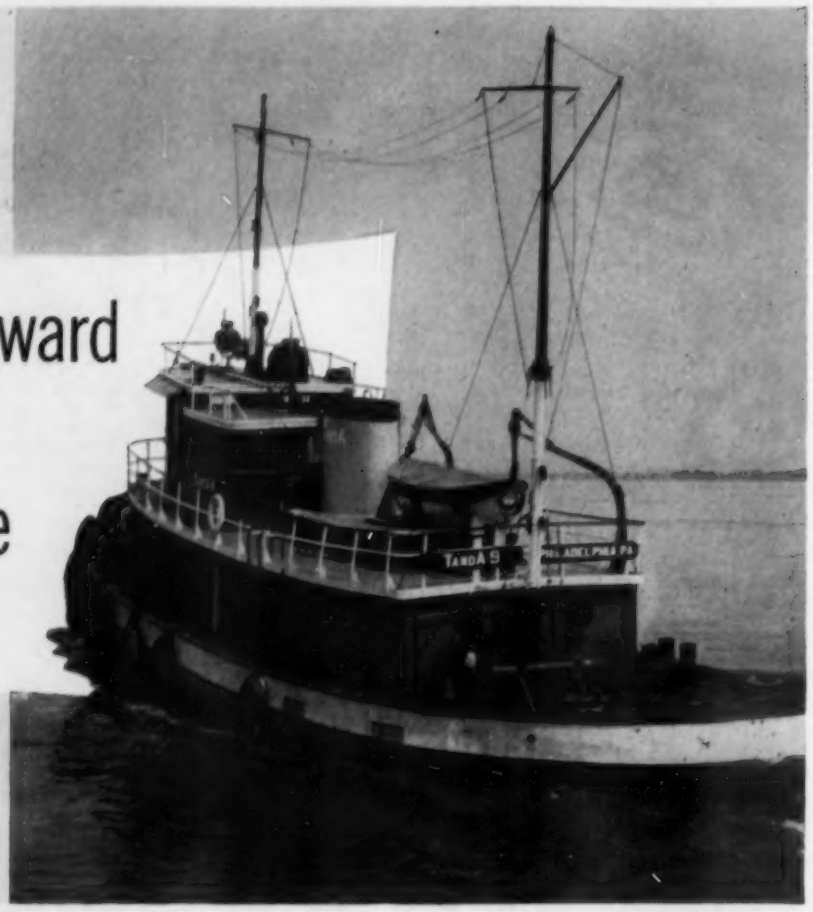

heading toward a long trouble-free life...

with

GULF DIESELMOTIVE and GULF DIESELECT

The powerful Atlas-Imperial Engine in this tug of the Taylor & Anderson Towing & Lighterage Company, Philadelphia, Pa., is on a true course toward dependable and economical operation with the ideal combination for workboat diesels —Gulf Dieselmotive and Gulf Dieselect.

GULF DIESELMOTIVE—the lubricating oil that has an unmatched record of low maintenance costs in this tough service. Here's why: Chosen for their ability to prevent hard carbon deposits in hot spots, the selected base stocks of Dieselmotive oil also provide an oxidation resistance safety factor. Its 100% solvent refining (which removes undesirable constituents) guarantees greater stability and more effective bearing protection. And Dieselmotive's superior additive response is obtained by carefully matching the additives to the base stocks. This insures clean rings and grooves, a minimum of piston crown deposits.

GULF DIESELECT—the straight run distillate fuel that burns evenly and completely, thus contributing further to engine cleanliness. And Gulf Dieselect has a high Cetane Index to assure good combustion at all speeds.

This combination of top quality lubricating and fuel oils can deliver more hours of operation between ring jobs, and lower maintenance costs for your fleet.

Contact your nearest Gulf office for more complete information on these quality products.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY
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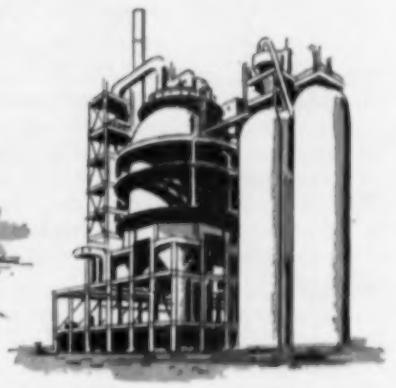
American Hammered Piston Rings . . .

field-tested money savers!



Why not specify piston rings that have *proved* themselves? Koppers rings have been saving money and cutting costs for years—throughout the oil and gas industry, the marine industry, on major railroads, all over the chemical field, throughout the aircraft business, in municipal and industrial power plants everywhere—wherever you find gas, Diesel or steam engines, pumps, compressors, forging hammers—*wherever piston rings are needed!*

They're built to take it . . . designed to cut down-time and maintain high compression . . . give longer, more satisfactory service . . . save you money on fuel and lubricating oil . . . *and that's exactly what they do.* And Koppers rings are available in all types, all sizes—from ½" to 10' diameter—specifically designed for the job they will do in the field where they will be used.

Always specify American Hammered Piston Rings. Benefit from over 100 years of experience in metal products. Use Koppers' complete engineering and metallurgical staff. Get skilled analysis of your specific problem, and prompt assistance. For 16 page Piston Ring booklet write to: KOPPERS COMPANY, INC., *Piston Ring & Seal Dept.*, 1408 Hamburg Street, Baltimore 3, Maryland.

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AMERICAN HAMMERED
Industrial Piston Rings

They licked a problem— before it happened— with STANODIESEL Oil M

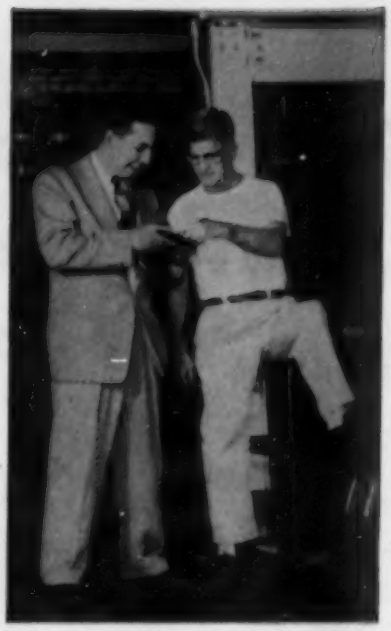
How Sturgis light plant planned ahead to eliminate source of possible power shut down

Sturgis, Michigan, light plant management in 1946 determined that it might be difficult to satisfy all power requirements if the light plant's large engine, or more than one of its small engines, was down. The plant is equipped with 5 engines—four GM 1,600 H.P. and one Busch-Sulzer 2,475 H.P. Plant management rightly figured that one of the keys to the problem was good lubrication. So, in 1946, STANODIESEL Oil M was tested in one General Motors engine.

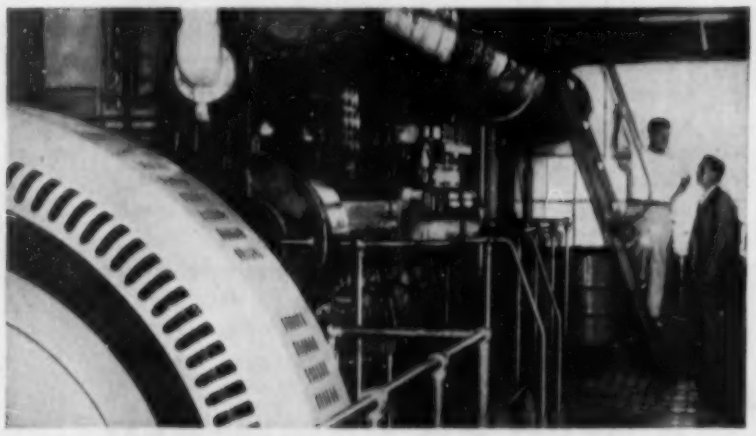
In 1947, based on its performance during the test, all engines were converted to STANODIESEL Oil M. In the nine years since, the plant has never had to shut down power to customers because of engine or oil failure. There have been no wear problems. Engines have stayed clean. There is no ring sticking. Bearing life is exceptional.

STANODIESEL Oil M can give this kind of performance for two big reasons: (1) its highest quality base stock, (2) its additive formula. STANODIESEL Oil M has superior stability. An oxidation inhibitor helps to prevent unwanted increases in oil viscosity. Detergent-dispersant additives keep crankcase, pistons, cylinder walls and other parts clean. An anti-foam agent controls foam.

There's a Standard Oil industrial lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Call him for more information about STANODIESEL Oil M. Or write Standard Oil Company, 910 S. Michigan Avenue, Chicago 80, Illinois.



J. J. Threlfall, superintendent and Donald Cripps, Standard Oil lubrication specialist check Don's data book on Sturgis light plant diesels. Don is well qualified as a lubrication specialist. He has been doing this work for nine years. He has an engineering degree from Michigan State University and is a graduate of the Standard Oil Sales Engineering School.



Sturgis, Michigan, light plant has four GM 1,600 H.P. engines and this Busch-Sulzer 2,475 H.P. engine. Engines receive progressive maintenance at 3,500 to 4,000 hours. STANODIESEL Oil M is used in all engines.

Quick facts about
STANODIESEL OIl M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult to lubricate areas and parts.
- Eliminates spark plug fouling in spark ignited engines and reduces combustion chamber ash deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil commingle.

STANDARD OIL COMPANY
(Indiana)

STANDARD

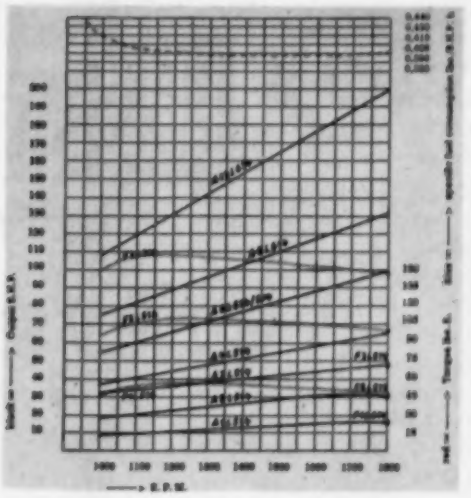
THESE PERFORMANCES TELL THE STORY

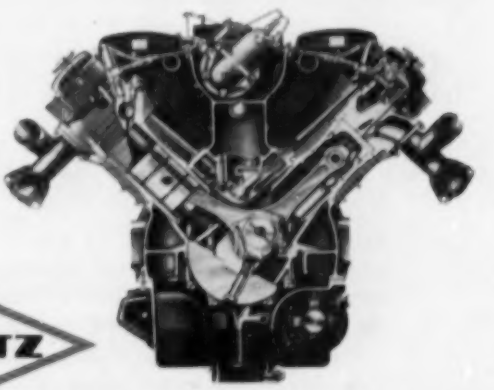
why the DEUTZ *air-cooled* DIESEL is being installed . . . and acclaimed!

PERFORMANCE DATA

Type	A/F1L 614	A/F2L 614	A/F3L 614	A4L 614	A6L 614/614	A8L 614	A12L 614
Number of Cylinders	1	2	3	4	6/6 V	8 V	12 V
Rotation when facing Flywheel	left-hand						
Combustion Principle	Swirl-Chamber						
Speed R.P.M.	1000 1800 1800	1000 1800 1800	1000 1800 1800	1000 1800 1800	1000 1800 1800	1000 1800 1800	1000 1800 1800
Mean Piston Speed ft./min.	905,4 1378 1656	905,4 1378 1656	905,4 1378 1656	905,4 1378 1656	905,4 1378 1656	905,4 1378 1656	905,4 1378 1656
m./sec.	4,7 7,0 8,4	4,7 7,0 8,4	4,7 7,0 8,4	4,7 7,0 8,4	4,7 7,0 8,4	4,7 7,0 8,4	4,7 7,0 8,4
Continuous Rating A (10% Overload) (Heavy Duty) B.H.P.	6,3 12,5 —	16,5 25 —	25 37,5 —	33 50 —	50 75 —	65 100 —	100 150 —
Blocked Intermittent Rating B (*Light* Duty) B.H.P.	— 14 16	— 28 32	— 42 48	— 55 66	— 82 100	— 110 132	— 165 200
Mean Effective Pressure lb./sq. in.	— 89 98	— 89 98	— 89 98	— 87,8 87,8	— 87 98,5	— 87,8 87,8	— 87,8 88,5
kg./cm.²	— 6,3 6,9	— 6,3 6,9	— 6,3 6,9	— 6,3 6,3	— 6,15 6,93	— 6,3 6,3	— 6,3 6,93
for Tractors B.H.P./R.P.M.	15/1650	30/1650	45/1650	60/1650	90/1650		
for Railcars B.H.P./R.P.M.				72/2000	110/2000	145/2000	220/2000
Min. R.P.M. on Continuous Rating				800			
Min. Idling R.P.M.				500			
Max. Torque for AL Model ft. lbs. R.P.M.	44,6 1300	86,6 1300	129,5 1300	173,3 1300	271,8 1300	385 1400	542 1400
mkg	6,2	11,9	17,9	24,6	37,8	49	78
Max. Torque for FL Model ft. lbs R.P.M.	50,6 1200	104,6 1100	159,1 1200	—	—	—	—
mkg	7,0	14,5	22	—	—	—	—
Bore in.				4⅜			
mm.				110			
Stroke in.				5⅞			
mm.				140			
Swept Volume cu. in.	81,16	162,32	243,48	324,6	486,9	649,3	973,8

Thanks to its interchangeable units, the air-cooled Deutz diesel has been adapted to practically every application for which engines are used . . . from mobile equipment, such as tracked and wheeled tractors, excavators and locomotives, to such stationary equipment as generators, pumps and quarry power plants. Air-cooling gives the Deutz easy starting and fast warm-up, too. That's why more and more leading manufacturers are installing this engine in their products. The data recorded in the table above and on the chart below tell how the Deutz diesel can give your customers outstanding performances. And can give *you* outstanding sales! For further information, mail coupon below without delay. Dealer inquiries invited.





DEUTZ

DIESEL ENERGY CORPORATION

82 BEAVER ST., NEW YORK 5, N.Y.

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I am interested in more details on use of the Deutz diesel
for the following purposes .....
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Name..... Address.....
City..... State.....
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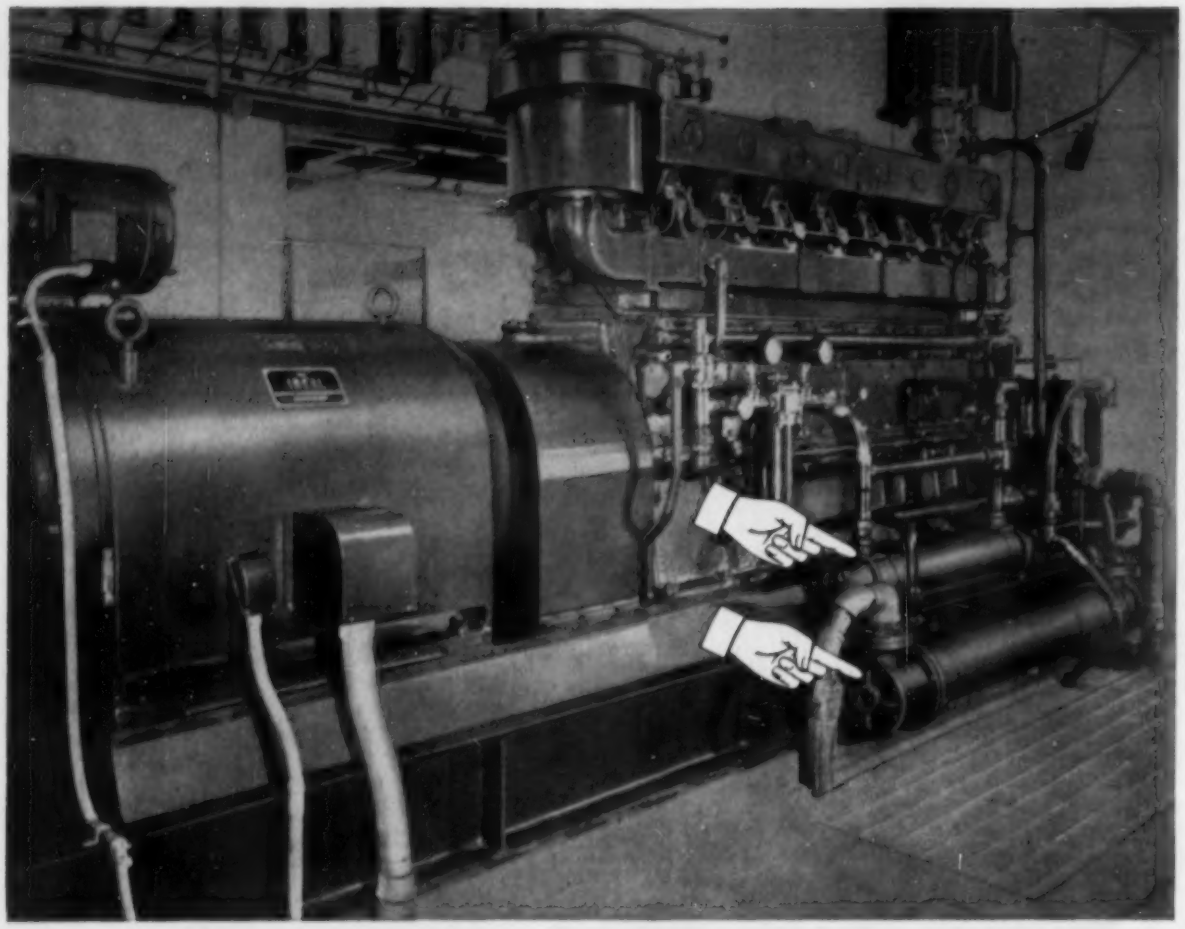

Ross Exchangers fortify this Superior Engine for emergency action in hurricane-hit Attleboro

When hurricane "Carol" hit Attleboro, Mass., causing a million dollars worth of damage, this 435-hp, heavy-duty Superior Diesel went into action immediately. Driving a 300-kw generator, it carried the entire load for pumping the community's water supply.

Called upon to meet an average five or six power emergencies per year, this stand-by diesel relies on two Ross Exchangers for lube oil and jacket water cooling. Engine temperatures are held within safe operating limits to insure dependable performance . . . *at any time!*

Because they can be "counted on" to provide the utmost in thermal efficiency and ruggedness — both in everyday service and during emergencies — Ross Exchangers are regularly specified for numerous types and makes of prime equipment . . . to cool lube oil, jacket water and hydraulic fluid.

Pre-engineered and fully standardized, these compact, easy-to-install units are available in a broad range of sizes to meet your requirements. For detailed information, request Bulletins 2.1K5 and 1.1K5. Ross Heat Exchanger Division of American-Standard, Buffalo 5, N. Y. In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

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ROSS HEAT EXCHANGER PRODUCTS

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FOR ALL DIESELS

FRAM WATER SEPARATOR AND FUEL FILTER REMOVES ALL WATER—TRAPS DIRT AND DUST!

A FRAM Water Separator and Fuel Filter will give your fuel injectors complete protection by:

1. Removing *all* water to save injectors from pitting and corrosion!
2. Trapping dangerous dirt to end abrasive action once and for all!

For longer life, less wear, fewer repairs—guard *each* diesel with a FRAM Water Separator and Fuel Filter! For complete details write to: FRAM CORPORATION, Providence 16, R.I. or to Fram Canada Ltd., Stratford, Ontario.

FRAM
OIL • AIR • FUEL • WATER
FILTERS

FAMOUS LAST WORDS:

"they wouldn't dare"

That's what they said the day before Pearl Harbor. Remember? But by now you'd think people would have learned. Let's face it—we must be ready for disaster at any moment. It may be an atom bomb—or it may be a fire, a flood, a hurricane. It's only common sense to be prepared for it, whatever it is. Take these precautions TODAY:

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

R. H. Wadman

DIGS COOL!

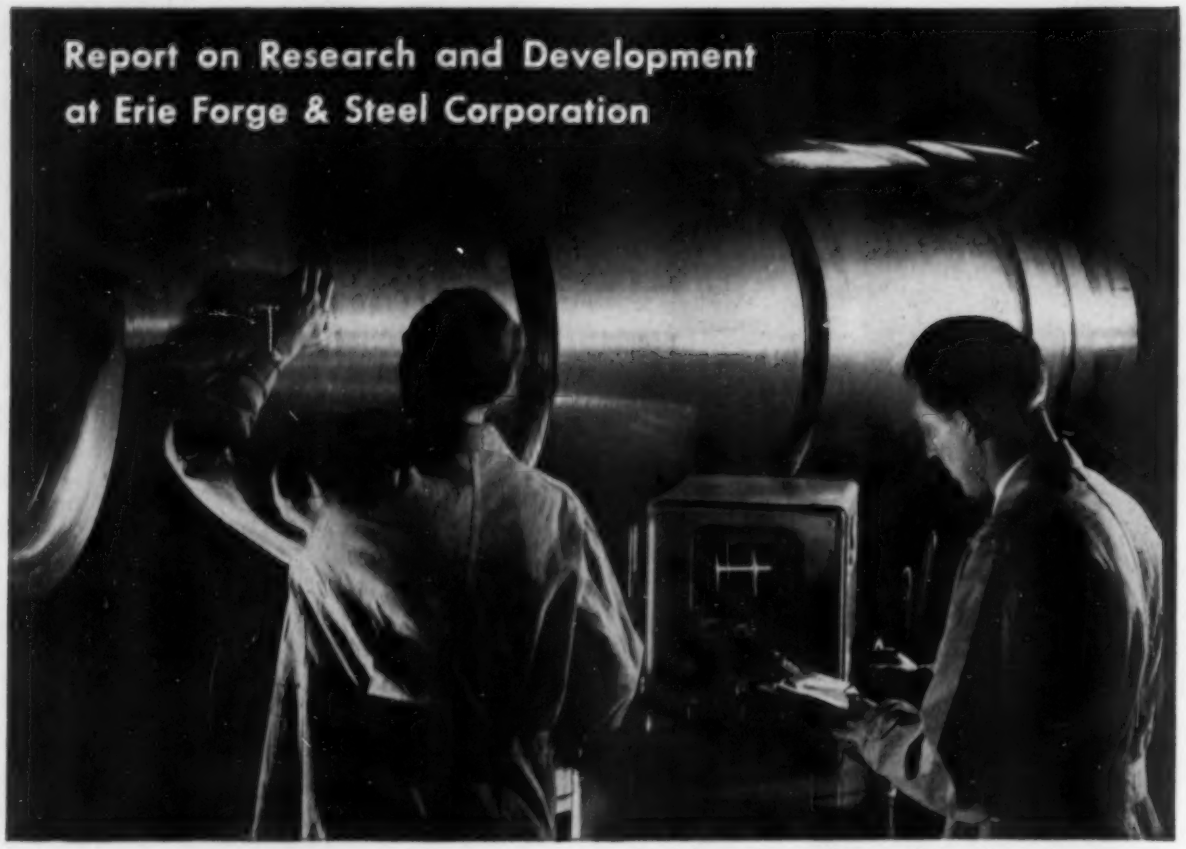
AND HARRISON HEAT EXCHANGERS DO THE JOB!

Harrison helps move the earth . . . by making heat bite the dust! High-powered shovels—driven by Detroit Diesel 2-cycle engines—turn in dependable, low-cost performance when Harrison's on the job controlling the heat. You'll find Harrison heat control equipment on many of the nation's leading diesels and other power equipment. For manufacturers know they can depend on Harrison—with over 45 years' experience in manufacture, design and engineering research. If you have a cooling problem, look to Harrison for the answer.

HARRISON

RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N.Y.

TEMPERATURES MADE TO ORDER



Shaft is rotating during non-destructive sonic test

No Defects In This 75,000 Pound Forging

Today's demands by the electrical industry for large rotor forgings free of unsound metal are met at Erie Forge & Steel Corporation by a continuing research, testing and development program.

For example, this 75,000 pound rotor forging is being tested by the Ultrasonic Reflectoscope, a test so sensitive that it will expose structural defects of microscopic size. Even under so rigorous a test, this huge forging showed *no defects*.

Through the years our continuously expanding program of Research and Development, keeping abreast of progress in the metal industry, has resulted in the use of the most modern techniques in the Open Hearth, Forging, Heat Treating and Quality Control Divisions. Under direction of our Metallurgical Department we are producing:

- Cleaner, sound ingots
- Control of phosphorus and sulphur
- Maximum elimination of hydrogen in steel making
- Ingot mould design and solidification characteristics
- New compositions with greater ductility, notch toughness
- Accurate temperature control in melting, forging, treating
- New forging techniques to insure metal soundness
- Improved concepts in testing and evaluating quality

Another example of the advantages of one responsibility and one control.

ERIE FORGE & STEEL CORPORATION • ERIE, PENNSYLVANIA

MEMBER AMERICAN IRON AND STEEL INSTITUTE

ERIE FORGE & STEEL CORPORATION

DIESEL LOCOMOTIVE MODEL OF PG GOVERNOR

WOODWARD

GOVERNORS for ENGINES and TURBINES

This governor is one of several hundred variations of the basic PG governor.

It is used on the engines of diesel-electric locomotives. Movement of the engineer's throttle lever sets the governor (electrically or pneumatically) for the desired engine speed.

The governor then senses whether the engine is carrying more or less load than required for maximum fuel economy at that speed, and automatically adjusts generator excitation to bring the load to that value.

For economy and simplicity of installation, the governor illustrated has the load control rheostat and servomotor to operate it mounted as an integral part, though these are often mounted separate from the governor. With simple modifications (usually just omitting parts) this same mass-produced governor is used for a variety of special applications. These include automatic control of prime movers driving boiler feedwater pumps, forced and induced draft fans, pipeline pumps or compressors, refrigeration compressors, air and gas compressors in chemical and petroleum processing plants and steel mills, oil well drilling, and marine engines (including automatic control of variable pitch propellers for best efficiency).

Thousands of PG governors have been in service for many years . . . positive proof that they give long, trouble-free operation. When an overhaul is finally needed, it is usually done by using our convenient, fast, economical unit exchange plan.

WRITE FOR DETAILS ON OUR UNIT EXCHANGE PLAN
Give serial number of typical governor when requesting any information.

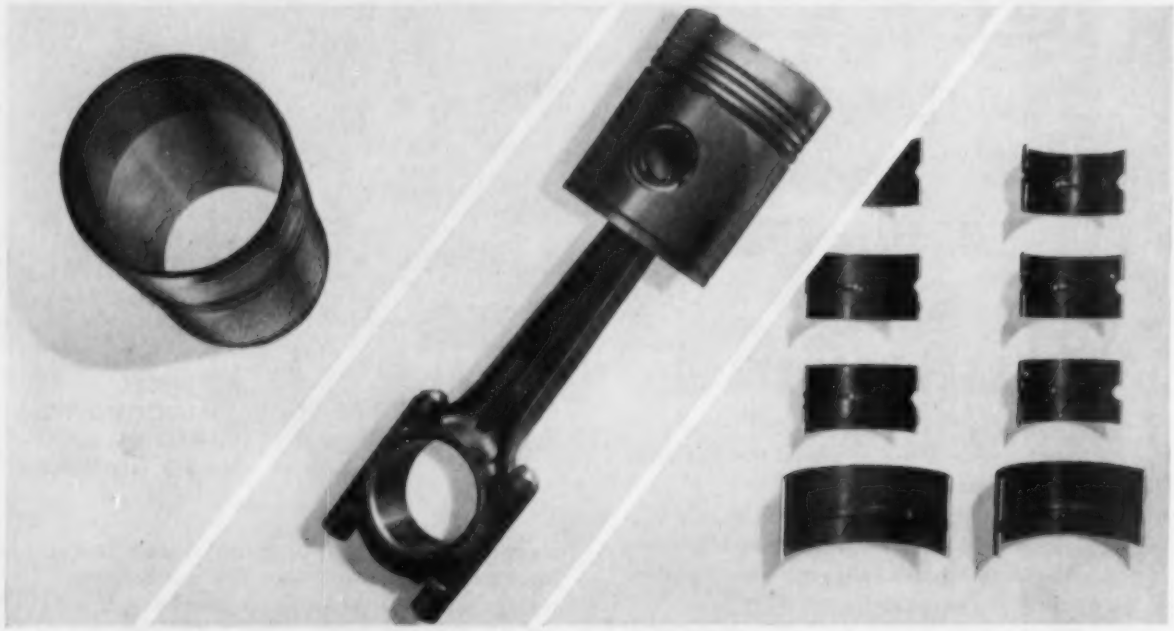
WOODWARD GOVERNOR COMPANY
ROCKFORD, ILLINOIS

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

The Engineer's Field Report

CASE HISTORY
RPM Delo Oils
LUBRICANT
Progressive Transportation Co., Compton, California
FIRM

RPM DELO holds piston wear to .001" after 201,253 miles of on-and-off highway hauling



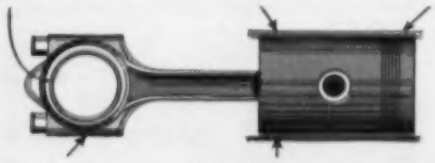
LUBRICATED WITH RPM DELO Oil, these engine parts were pulled from a Cummins HR diesel after 201,253 miles. A portion of this mileage was put on during four months of rugged service spotting loads of heavy pipe in the Arizona desert. When the engine was taken down, after two years of this on- and off-highway hauling, Progressive Transportation Co. found RPM DELO Oil had kept lacquer, gum, sludge, and deposits from forming...rod bearing wear varied between .0005 and .001 inch and pistons showed maximum wear of only .001". No wear at all evident on main bearings. Progressive Transportation uses RPM DELO Oils in all its large fleet of tractors—some of which have traveled well over 200,000 miles without overhaul.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps all parts clean



Metal-adhesion qualities keep oil on parts in running or idle engines—inhibitor resists foaming

LUBRICATING OILS RPM DELO

For More Information... about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • **STANDARD OIL COMPANY OF TEXAS**, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • **THE CALIFORNIA COMPANY**, Denver 1, Colorado

SCHWITZER VIBRATION DAMPERS

MILLIONS OF AUTOMOTIVE, TRUCK AND HEAVY DUTY ENGINES

Operate smoother, longer and with less maintenance with Schwitzer Dampers • Precision controlled elastic members, tailored to individual applications, minimize torsional vibrations • Schwitzer originated and developed this rugged, simplified Damper—another advancement in smoothness and economy.

Schwitzer assures you of advanced design and economy in Fluid Flow and Vibration Damping Products.

SCHWITZER CORPORATION • INDIANAPOLIS 7, INDIANA

Northeast Diesel Notes

By A. B. Newell

THE New York, New Haven & Hartford Railroad now has on order 160 diesel locomotives of different makes and 60 of these are of the new type capable of operating also on the New York Central third rail system.

MELVIN DAVIS of Mohegan, Maine has purchased a 150 hp Cummins diesel for installation in his fishing boat. Sale was made by Cummins Diesel of New England, Allston, Mass.

RUDNE Construction Company of Coldchester, Conn., just bought a new model 255 P&H diesel equipped backhoe trench digger for use on the Otis Air Base at Falmouth, Mass.

THE LANE Construction Company of New Haven, Conn. has purchased two new P&H 1055, 3½ yard shovels for use on the Connecticut Thruway. The power in these shovels is Caterpillar D 364 diesels. The dealer is Casey-Gesner Equipment Corporation of Hamden, Conn.

ROBERT CHAMBERS of Monroeville, Penna., has just installed a new 30 kw generator driven by 95 hp Cummins diesel sold by Cummins Diesel Engines, Inc. of the same town.

A MODEL 1055 P&H dragline owned by Wendel Turner of Phillipsburg, Penna., has been equipped with a new 315 hp Cummins engine also sold by Cummins Diesel Engines of Monroeville.

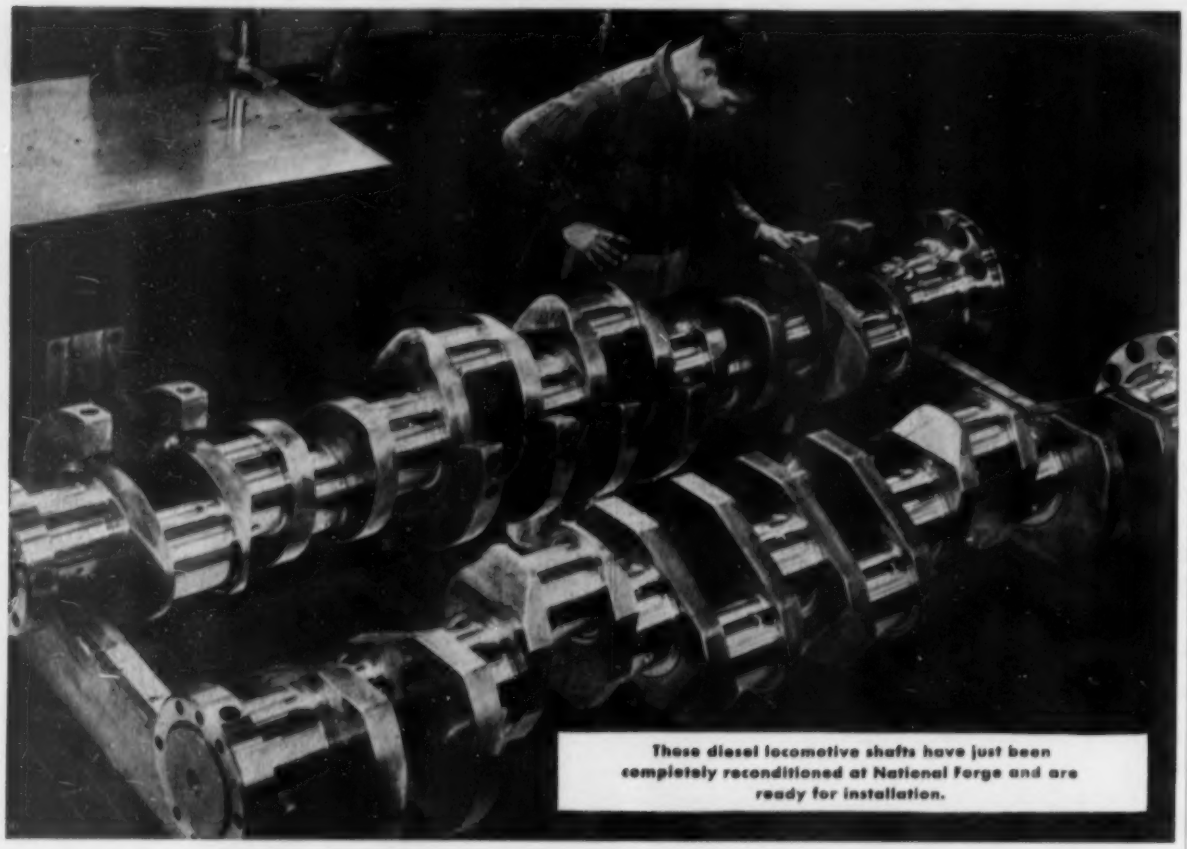
THE 60 ft single screw *Steelfin* built by Blount Marine Corporation of Warren, R.I., has been sold and delivered by the builders to Offshore Boat Rental Service of New Orleans, La. The owners will convert to twin screw propulsion before placing the new vessel in service.

THE Philadelphia Engineer Corps has called for bids for a 20 inch diesel-electric suction dredge to be delivered at Manila Bay in the Philippine Islands.

BIDS will be taken for the construction of two Texas Towers by the Sixth Naval District, Public Works officer, Charleston, South Carolina upon acceptance of completed designs by Friede & Goldman, Inc. of New Orleans, La. The preliminary design work and founding of the project was done by the Navy Bureau of Ships. The size, design and purpose of these structures will differ from the offshore towers of earlier construction. The largest one will be erected 12 miles off the coast in 100 ft of water with a paltform 40 ft above the water line. The smaller type will be located in 60 ft of water, 2½ miles off shore with a platform 40 ft above the water. In both instances the lower deck will clear hurricane waves. The purpose of these platforms is to house personnel who will study temperature and pressure variations in the sea, salinity factors, thermal gradients, and periods and lengths of ocean waves. They will be equipped with diesel-electric generators, auxiliary machinery, heating, ventilation, refrigeration and crews' quarters. The large platform will have sleeping accommodation for 30 persons, the small one for four and in both instances helicopter landings will be provided. Radar and radio communication facilities will be provided.

THE EPPARD Coal Company of Shady Springs, West Virginia has purchased a 300 hp Cummins diesel to drive a 150 kw generator. Cummins Diesel Sales of Charleston, West Virginia made the sale.

A FLOATING transfer unit costing $1 million will be powered by diesel-electric machinery and is scheduled for comple-



These diesel locomotive shafts have just been completely reconditioned at National Forge and are ready for installation.

RECONDITIONING DIESEL LOCOMOTIVE SHAFTS

● National Forge has been well recognized as a supplier of quality crankshafts for original equipment for over forty years. Through these years we have kept abreast of the steadily increasing demands for greater quality and workmanship.

Now this experience and "know how" have been applied to the problem of reconditioning worn crankshafts. National Forge has established a complete and separate department for this rebuilding which includes a newly developed chromium plating process and facilities for straightening, grinding and polishing.

National Forge offers you this complete rebuilding service for your worn crankshafts. We will be pleased to have your inquiries and will be glad to have our field representatives discuss this service with you.

NATIONAL FORGE AND ORDNANCE COMPANY
PRODUCES BETTER STEEL FORGINGS AND MACHINE WORK
IRVINE, WARREN COUNTY, PENNSYLVANIA

tion in time for the opening of navigation on the Great Lakes in 1957. It will be capable of handling bulk cargo between river vessels and cargo vessels at Chicago. It is the only one of its kind. Further particulars will be available later.

C. W. BLAKESLEE & Sons of New Haven, Conn., are the proud owners of a new 255 Backhoe P&H driven by a 387-C P&H diesel sold by Gesner Equipment Corp. of Hamden, Conn.

THE Miller Knight Coal Co. of Slippery Rock, Penna., has installed a new 300 hp Cummins diesel on an Osgood Model 1007 dragline.

ONE OF the most interesting diesel applications is in the scrap metal business of M. Schiavone & Sons of New Haven, Conn. They use a 955 A P&H crawler crane driven by a Cat D 337, a 255 ALC crawler crane powered by a 387-C P&H diesel and 155 P&H truck crane equipped with a 387 C diesel of the same make. All this comparatively new dieselized equipment is used in reducing scrap metal to usable form.

UP ON the Main Turnpike the Sorin Construction Co. of Hartford, Conn., has just put into service a new 1055 P&H shovel, sold by Gesner of Hamden.

THE FIRST dragger ever built at Mhethegan River, Nova Scotia, is a 64 footer powered by an Atlas diesel, of 300 hp giving a speed of 10 knots. Construction was financed through the Fisherman's Loan Board at $70,000.

A PAIR of six-cylinder 185 hp Allis-Chalmers Buda diesels have been sold for installation on *Portland Pilot* by the Harbor Supply Oil Co. of Portland, Maine.

AN INDICATION of the growing magnitude of the market for dieselized equipment in strip mining is the handling of 270 million yards of earth in Pennsylvania in a year to uncover 19,212,869 tons of coal.

CONSIDERABLE amounts of dieselized equipment of various kinds will be needed to build the $11 million B & O Railroad bridge between Elizabeth, New Jersey and Howland Hook, Staten Island, N.Y.

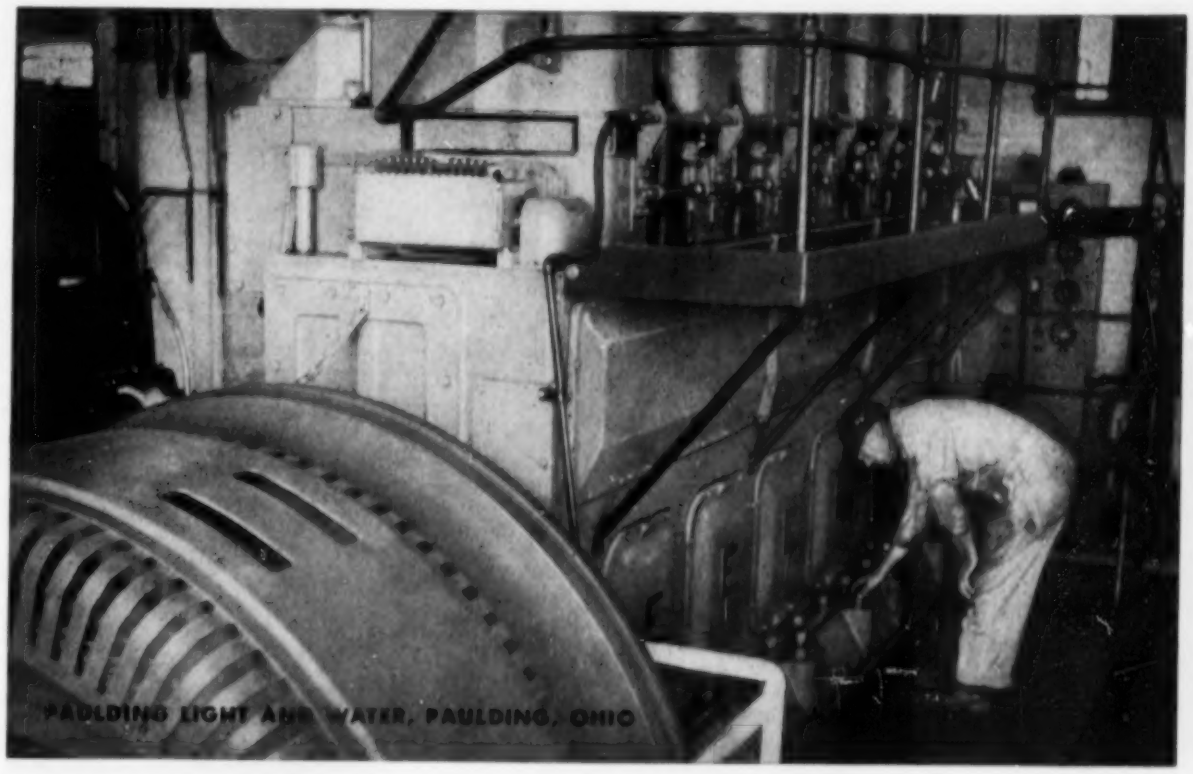
THE Gladding-Hearn Shipyard of Somerset, Mass., is building a 43 ft workboat for the Bay State Dredging & Contracting Co. of Boston. The engine will be a General Motors diesel.

THE New England Dredge & Dock Co. recently purchased two model 255 P&H Crawler Cranes powered by 378-C P&H diesels. These cranes are used on the inshore end of the extensive harbor construction work by the company.

Literature on Vibration

A new bulletin issued by T. R. Finn & Company, Inc., describes the basic theory of vibration isolation and shock absorption. It describes various types of machinery vibration, gives basic data, formulae and graphs that enable the reader to recognize his own problem, and reviews practical methods of shock vibration and control. Copies of the bulletin, SVC-55, may be had by writing to T. R. Finn & Company, Inc., Industrial Division, 200 Central Avenue, Hawthorne, New Jersey.

NOW AVAILABLE! The Completely new Volume 21 of DIESEL ENGINE CATALOG. This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.



"16,587,402 H.P. hours without oil change using Cities Service C-300 Lube Oil!"

1000 KW Enterprise uses only one gallon of oil in 23,205 BHP hours, has no oil reclaimer.

The main part of the power output of Paulding Light and Water Company is developed by its dual-fuel, 1000 KW Enterprise Unit.

Mediocre performance can't be tolerated at Paulding . . . the power load is running twice that of seven years ago!

"Fortunately," says Superintendent James J. Leslie, "performance is tops—and much of the credit is due Cities Service C-300 Lube Oil. We really pile up hours with C-300 . . . and still get excellent engine life. I've never had the head off the Enterprise since it was first installed in 1953, yet compression, fire pressure, and fuel economy are still very good.

"We've actually logged up to 16,587,402 H.P. hours without an oil change. We use only 1.5 gallons of C-300 Lube Oil per day, which amounts to 23,205 brake-horsepower hours per gallon . . . and that's with no oil reclaimer! I'd recommend Cities Service to any power plant."

If you're interested in Mr. Leslie's recommendation, talk with your Cities Service Lubrication Engineer. He can tell you of other outstanding case histories. Or write: Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.

Electric Service Goes Hand in Hand with Cities Service at Paulding Light & Water. Paulding's Enterprise dual-fuel power unit gets 23,205 BHP hrs. for every gallon of Cities Service C-300 Oil that's consumed. Oil changes are made about every 11,000 hrs.

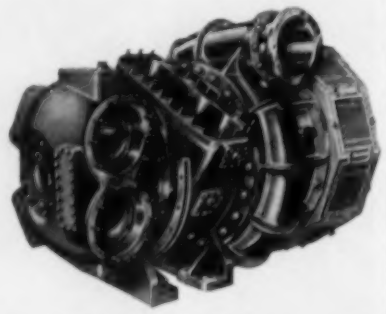
"We're Really Able to Pile Up Hours and still get good engine life using Cities Service C-300 Lube Oil," says Supt. Leslie. "I've never had the head off the Enterprise since it was installed in 1953. Compression, fire pressure, and fuel economy are excellent."

CITIES SERVICE

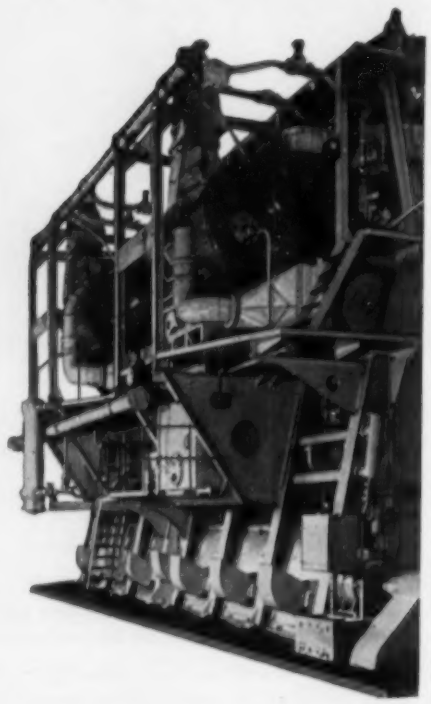
QUALITY PETROLEUM PRODUCTS

Motor-Generator Set

A variable frequency motor-generator set has been developed by Kato Engineering Company, Mankato, Minnesota. The electric motor operates on regular 60 cycle electricity, driving the Kato generator with V-belt attachment. The generator frequency is adjusted from 45 to 60 cycles on this particular model by merely turning an adjustment wheel on the end of the unit. The self-centering V-pulley on the motor spreads as the generator is pulled away, allowing the belt to move closer to motor shaft, thus decreasing the amount of revolutions per minute, decreasing the cycles from 60 downwards to 45. Once adjusted the device maintains accurate speed and is easy to operate. A frequency meter, mounted on generator panel indicates when the desired change has been made. Kato's experimental engineers are working to develop similar units to facilitate frequency adjustments on high cycle generators to enable industry to test equipment made to operate on various electrical frequencies. These machines enable a single source of electricity to do many jobs. This particular machine includes a Kato 1000 watt generator of 115 volts constant ac voltage. The variable frequency generator is single phase and operates at from 1350 to 1950 revolutions per minute. Dc exciter voltage is 90. Kato has built similar units with dc field exciter mounted on motor to maintain constant dc voltage supply to the ac generator field.



Harland & Wolff chose these Napier Turbo Blowers



Two Napier Type MS 600 turbo blowers are fitted to the Harland & Wolff S.A. 6 single-acting two-stroke Diesel which powers the Blue Funnel Line M/S DEMODOCUS. The S.A. 6 is one of the first engines of its type to be successfully turbo pressure-charged without the use of mechanically driven scavenge pumps. Why did Harland & Wolff choose *Napier* turbo blowers? Here are three good reasons—

- Napier blowers have *high adiabatic efficiency*, resulting in maximum power increase and low fuel consumption.
- Journal bearings on the MS 500 and 600 Napier blowers are sleeve type, and with proper lubrication they will last as long as the engine itself. The MS 500 and 600, the largest blowers in the Napier range, are built especially for marine applications.
- A high standard of workmanship is guaranteed by Napier's long experience in precision engineering.

Napier turbo blowers are available in seven sizes for engines of 140-4,000 h.p. afloat and ashore. Multiple installations for engines of higher powers. On 4-stroke Diesels they can double the power, on 2-strokes they increase it by over 30%—often at a lower specific fuel consumption. Napier turbo blowers are currently in use in 69 countries.

for this engine

which powers this ship

NAPIER Turbo-blowers

D. NAPIER AND SON LIMITED · LONDON · W.3 · ENGLAND

Representative: L. O. Brooks Suite 909, Dupont Circle Building, 1346 Connecticut Avenue, N.W., Washington 6, D.C. Tel: Dupont 7-2123

CRC T9

LMOA Convention Program

The official program for the Locomotive Maintenance Officers' Association 1956 Annual Meeting to be held September 10-12 inclusive at the Sherman Hotel in Chicago has been announced and contains many topics of interest to diesel railroad men everywhere. This Association has done much to help improve diesel operations for our country's railroads, and this year's convention promises to be one of the best ever.

Orders For Engines

The Navy has awarded Cleveland Diesel Engine Division of General Motors Corp. a $2,874,839 contract for diesel ship engines, the Commerce Department announced recently.

The Rock Island Railroad has ordered 10 general purpose diesel locomotives from Electro-Motive Division of General Motors Corp. The diesels will cost close to $2 million and will be used in both yard and road service. They are scheduled for delivery in April, 1957.

Director of Engineering

International Harvester Company has just named Howard S. Manwaring, assistant director of engineering since 1953, to the position of director of engineering. The announcement was made by P. V. Moulder, president. Moulder said that, in addition to his general administrative duties, Manwaring would place special emphasis on motor truck and construction equipment engineering activities under the direction of A. E. W. Johnson, vice president in charge of engineering.

Manwaring joined the Harvester organization in 1934 as an experimental engineer at the company's Fort Wayne motor truck plant. He became product and test engineer at Harvester's Tractor Works in 1935 and was appointed manager of engineering, foreign operations, in 1946, serving in that capacity until his appointment to the position of assistant director of engineering.

As for smoking, there are differences of opinion as to the effect on man, but no question about the trouble brewing for the smoking engine, especially at the exhaust.

Hauls More With Diesels

Starting with an experimental repowering of a gasoline tractor early this year, Indianapolis-Kansas City Freight Lines, Kansas City, Mo., now have 16 units powered with Cummins diesels which are hauling the same amount of freight that formerly used 32 gas powered units. After the first job came through with flying colors, five more gas units were repowered. The engine used was the JT-6-B Cummins Turbodiesel, rating 175 hp.

The next step in the diesel changeover program was the purchase of 10 White 9000's in April and getting them in service in late May. Each new White is powered with the same Cummins engine on which the fleet is now being standardized. Engine sales were handled by Cummins Kansas City Diesel Sales Corporation, Kansas City, Mo.

ASTM National Meeting

An interesting technical program will mark the Second Pacific Area National Meeting of the American Society for Testing Materials. The meeting to be held September 16-22, 1956 in Los Angeles, will be centered at the Statler Hotel. The scope of the program, the largest in ASTM history, is such that it is sure to offer topics of interest to every engineer and technician. Exhibits of the latest in instruments and equipment will be a featured part of the meeting.

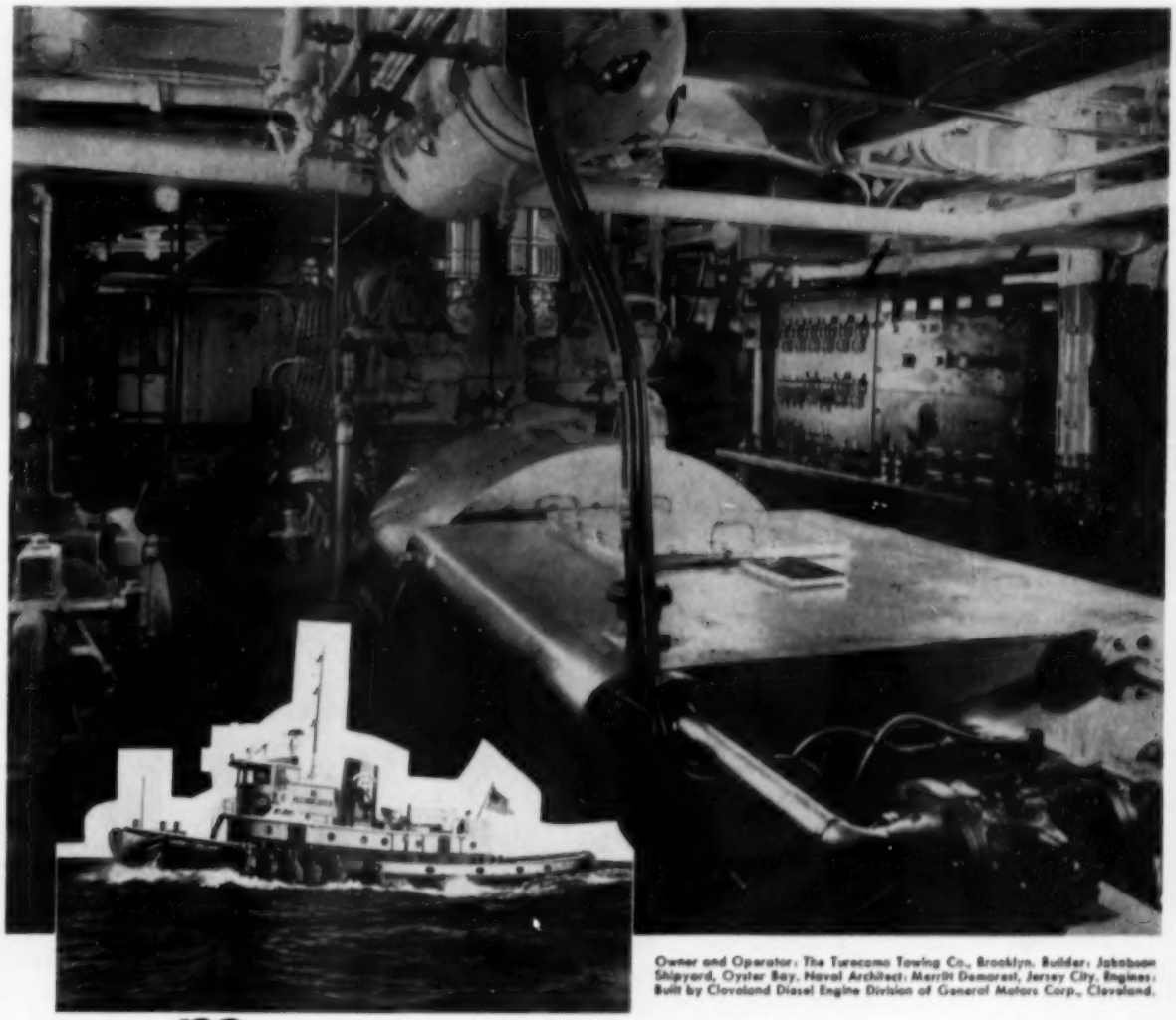
Among the variety of subject related to research and testing of materials the following symposiums are scheduled: Railroad Materials—Diesel Fuels and Lubricants; and Cleaning Materials; Lubricants Analysis—Spectrographic Analysis of Lubricating Oils; Titanium—Stressing Testing Problems; Properties, Tests and Performance of Electro-deposited Metallic Coatings (1956 Spring Meeting Symposium plus special papers); Structural Sandwich Constructions; Full-Scale Tests on House Structures; Industrial Finishes; Turbine Oils; Vapor Phase Oxidation of Gasoline; Wood Poles; Design for Seismic and Shock Loading; Developments in Glued-Laminated and Other Wood Constructions; Wood for Marine Uses; Its Protection from Marine Borers; Industrial Water; Nondestructive Testing; Radioactive Isotopes.

Bulletin on Algae Control

A new simple, low-cost way to stop algae problems in cooling systems through use of No. 120 Series Algaecide is described in a leaflet released by Allis-Chalmers Manufacturing Company. The new algaecide is a complex organic rosin base liquid, weighing approximately one pound per pint. It is simple to apply and safe to use. A table illustrates its effectiveness on six different species of algae. No. 120 Series Algaecide is currently being used in numerous industries to successfully control algae and other microscopic organisms which complicate the overall water treatment program in cooling systems. Copies of "No. 120 Series Algaecide," Bulletin 28X8434, are available on request from Allis-Chalmers Manufacturing Company, 961 S. 70th Street, Milwaukee, Wisconsin.

Condensed Valve Catalog

A new 32 page condensed valve catalog, No. 201, is available from the Automatic Switch Company of Orange, New Jersey, manufacturers and designers of Asco Solenoid Valves and Electromagnetic Control. The latest designs in Asco's line of 2, 3 and 4 Way Solenoid Valves are included in this easy to read condensed catalog. It contains engineering information, flow charts, operation and construction details, illustrations, prices, etc. At a glance, from a unique selection chart, the reader can choose a solenoid valve to suit his requirements.



Owner and Operator: The Turecamo Towing Co., Brooklyn. Builder: Jakobson Shipyard, Oyster Bay. Naval Architect: Merrill Damorest, Jersey City. Engines: Built by Cleveland Diesel Engine Division of General Motors Corp., Cleveland.

Marquette GOVERNORS provide steady power control for the new "Barney Turecamo"

Extreme accuracy is just as important as extra power on today's modern diesel tugboats. That's why Marquette Hydraulic Governors by Curtiss-Wright are specified for tugs like the "Barney Turecamo", one of the newest tugboats serving New York Harbor.

Thousands of diesel-powered marine vessels of every description are daily proving the accuracy and dependability of Marquette Governors. Our engineering facilities are at your disposal for solving all problems of power control.

Massey GOVERNORS

Marquette GOVERNORS

MARQUETTE METAL PRODUCTS DIVISION
CURTISS-WRIGHT
CORPORATION • CLEVELAND 10, OHIO

Other Marquette Products: AIRCRAFT WINDSHIELD WIPERS • ANTI-FRICTION BEARING TEXTILE SPINDLES • SPRING CLUTCHES PRECISION PARTS AND ASSEMBLIES • ROTARY OIL PUMPS

Twin Disc's new SP-321 PTO

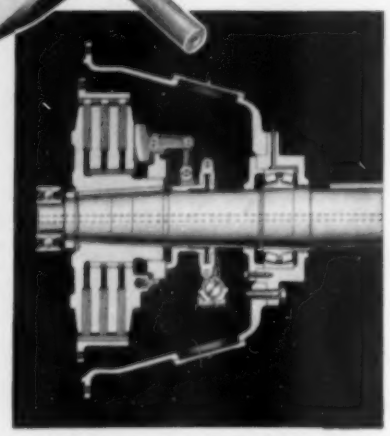
meets increased power requirements of modern industrial engines

Increased rpm. . . . increased hp output—that's the trend among industrial engine manufacturers. And that's where Twin Disc comes into the picture with its new SP-321 Power Take-Off—a friction clutch designed to meet the increased power transmission requirements of today's higher speed, higher horsepower industrial engines.

Unusually compact for its high capacity, this new PTO can handle up to 6730 lbs.-ft. of torque and transmit up to 602 hp at 1550 rpm. It's available with a standard SAE No. 00 flywheel housing adapter to meet the widest range of industrial power units in its hp and rpm ratings.

Other features include a triple driving-plate construction to provide ample friction surfaces to withstand excessive heat . . . a pilot bearing with double-width bearing race for greater lubrication retention and long life . . . and a spherical roller bearing at the clutch output shaft for greater overload and side-pull capacity.

The new SP-321 Power Take-Off —along with the recently announced SP-318 and SP-314—makes the Twin Disc line of heavy-duty friction power take-offs *the broadest, most complete line available.* For full information, write Twin Disc Clutch Company, Racine, Wisconsin. Request *new* Bulletin 308.



Twin Disc's new SP Power Take-Offs feature: counter-balanced engaging linkage; positive-type clutch engagement; pilot bearing with double grease shield; clutch plates with maximum friction area; spherical roller bearing; heavy-duty, oversize output shaft; easily adjusted clutch through pin and adjusting ring.

TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • TULSA

Exterior view of the Mech-Hydro locomotive with McClure Kelley, President of B-L-H, stepping out of the door of the cab after completing inspection of the new locomotive. Note the low design to match the contours of the new lightweight trains.

LIGHTWEIGHT MECH-HYDRO LOCOMOTIVE FOR TRAIN X

By ARNOLD B. NEWELL

IN keeping with the current trend to further reduce the cost of train operation, Baldwin-Lima-Hamilton has introduced a new type of locomotive especially for use in the operation of lighter weight trains. The first of these locomotives has been manufactured for the New York Central's train *Xplorer* and two more will be delivered shortly to the New York, New Haven & Hartford Railroad which is currently undergoing a number of important improvements in train services. The new diesel locomotive is called the Mech-Hydro because it is a combination of mechanical and hydraulic drive employing a system of operation new to American railroads although it has been used with conspicuous success in Europe for some 15 years.

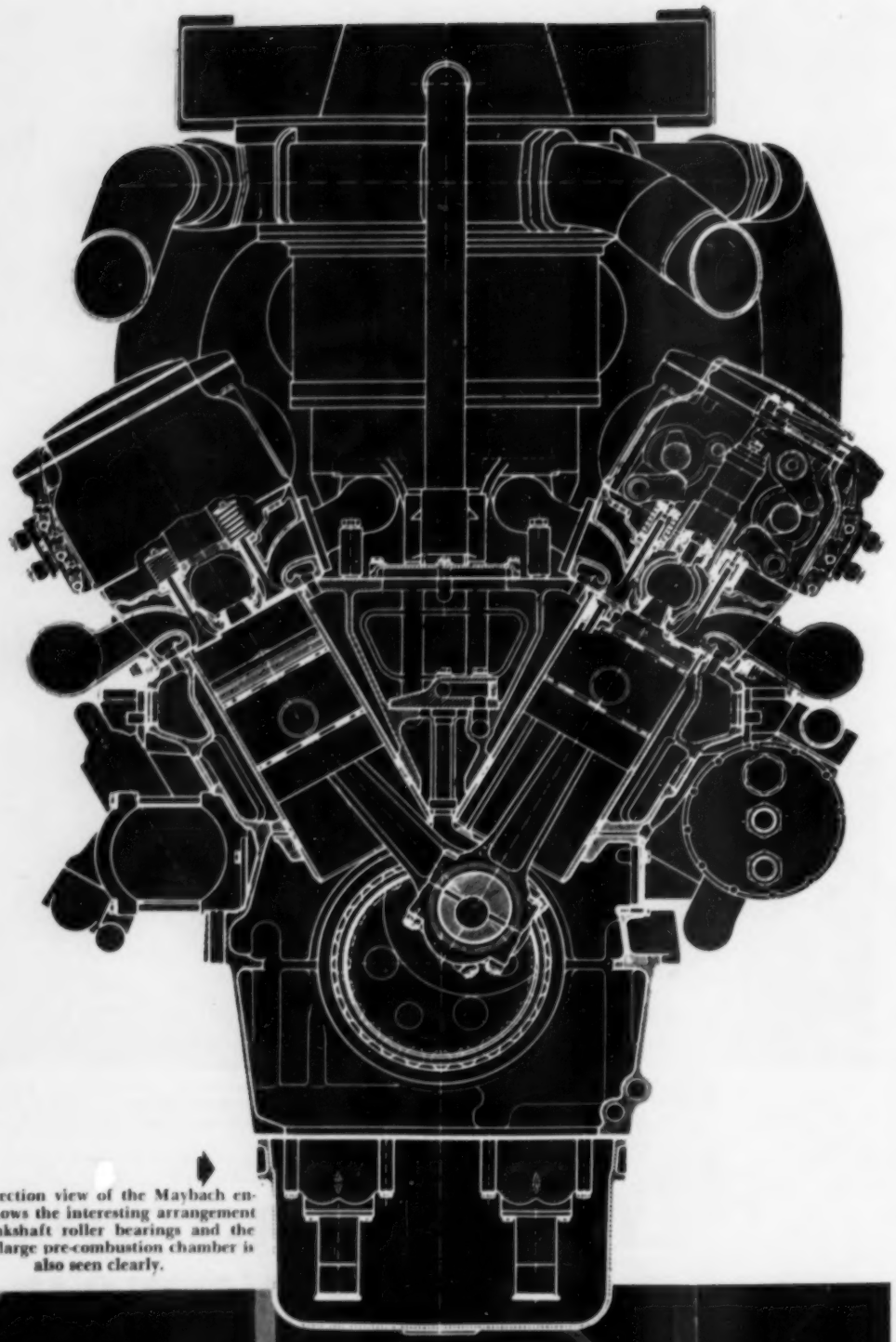
A matter of historic interest is that this new locomotive put in an appearance just 125 years after Matthias W. Baldwin designed and built the first of a line of locomotives destined to play a vitally important part in the development of railroading in America and other parts of the world.

This interesting departure from conventional diesel-electric drive is an experimental unit of road type with an 0-4-4-0 wheel arrangement equipped with one 4-wheel propulsion truck and one 4-wheel idler truck. The complete power package, made up of the 1000 hp diesel engine, hydraulic transmission, the drive shaft and axle drives is carried on the power truck. Of special importance is the locomotives body's method of suspension from the truck by means of swing links which permit the locomotive to roll toward the direction of lateral forces, thus reducing the effect of centrifugal force and permitting higher speed operation. The power element is so arranged that it can be quickly removed and replaced in order to provide maximum utilization. There is an auxiliary power plant on the locomotive made up of an 8-cylinder V-type diesel direct connected to a 300 kw, 440 volt, 3-phase 60-cycle generator which supplies all the train power. Components of this engine are interchangeable with the 1000 hp main engine. The locomotive weighs 87 tons whereas a conventional diesel-electric locomotive is larger and weighs

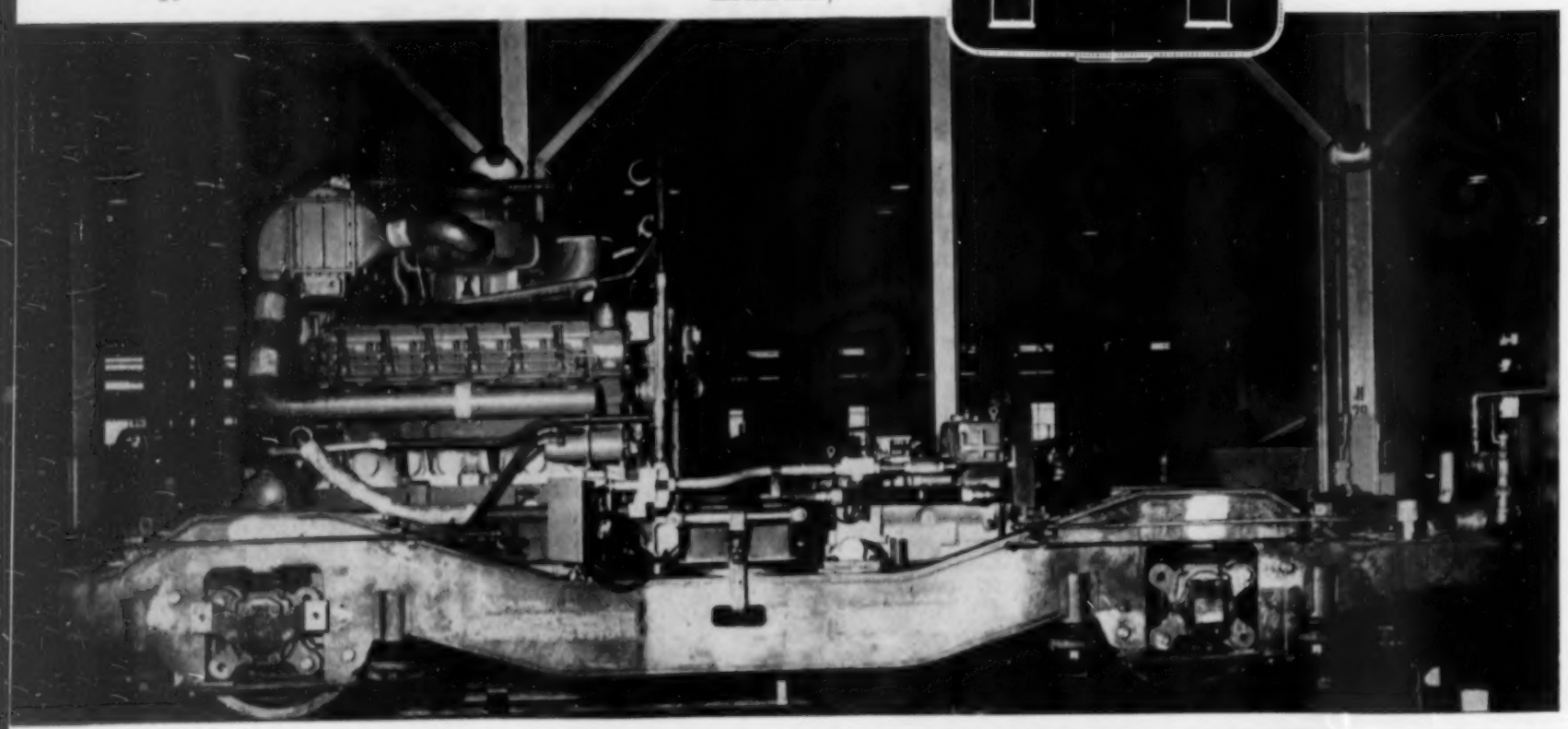
about 125 tons. Overall length is 58 ft 9 in., width is 10 ft 6 in. and the height of 11 ft to match the contour of lightweight cars is accordingly less than the usual 15 ft. Top speed is 120 mph and the continuous rating is 21,000 lbs. at 12.6 mph.

Of unusually simple construction the Baldwin Maybach transmission is fully automatic in its response to locomotive speed and engine load demands. Briefly described, it consists of a permanently filled hydraulic torque converter, and a four-speed mechanical gear box composed of three pairs of helical gears operating in conjunction with positive over-running claw clutches. The torque converter has an impeller driven by the engine and a turbine with two sets of blading which shifts along its axis to engage or disengage the output shaft. Shifting of the turbine rotor imposes a reverse set of blading in the oil stream thus setting up a weak backward torque to synchronize the gear train and permit smooth engagement of the claw clutches. The gears are continuously in mesh and gear changes are accomplished by the engaging and disengaging the claw clutches which interlock quickly, smoothly and require only slight pressure and movement of the control linkage. To cool the transmission, water from the radiator is by-passed through the water jacket surrounding the torque converter and the transmission oil heat exchanger. There are four speeds ahead and reverse giving high efficiency under all operating conditions. Full horsepower for continuous tractive effort is maintained throughout the operating range of the locomotive. Reversing is made fool-proof with controls so arranged that the locomotive must come to a full stop before the transmission can reverse even though the operator may put the control lever in the opposite direction before the locomotive comes to a complete stop.

In general appearance the Baldwin Maybach diesel is similar to the conventional V-type engine. Its operating speed is 1500 rpm and its bore and stroke are 7.3 in. x 7.9 in. It is new to the Ameri-



Cross section view of the Maybach engine shows the interesting arrangement of crankshaft roller bearings and the rather large pre-combustion chamber is also seen clearly.



The comparatively small amount of space occupied by the engine and transmission assembly on the power truck is shown in this installation view.

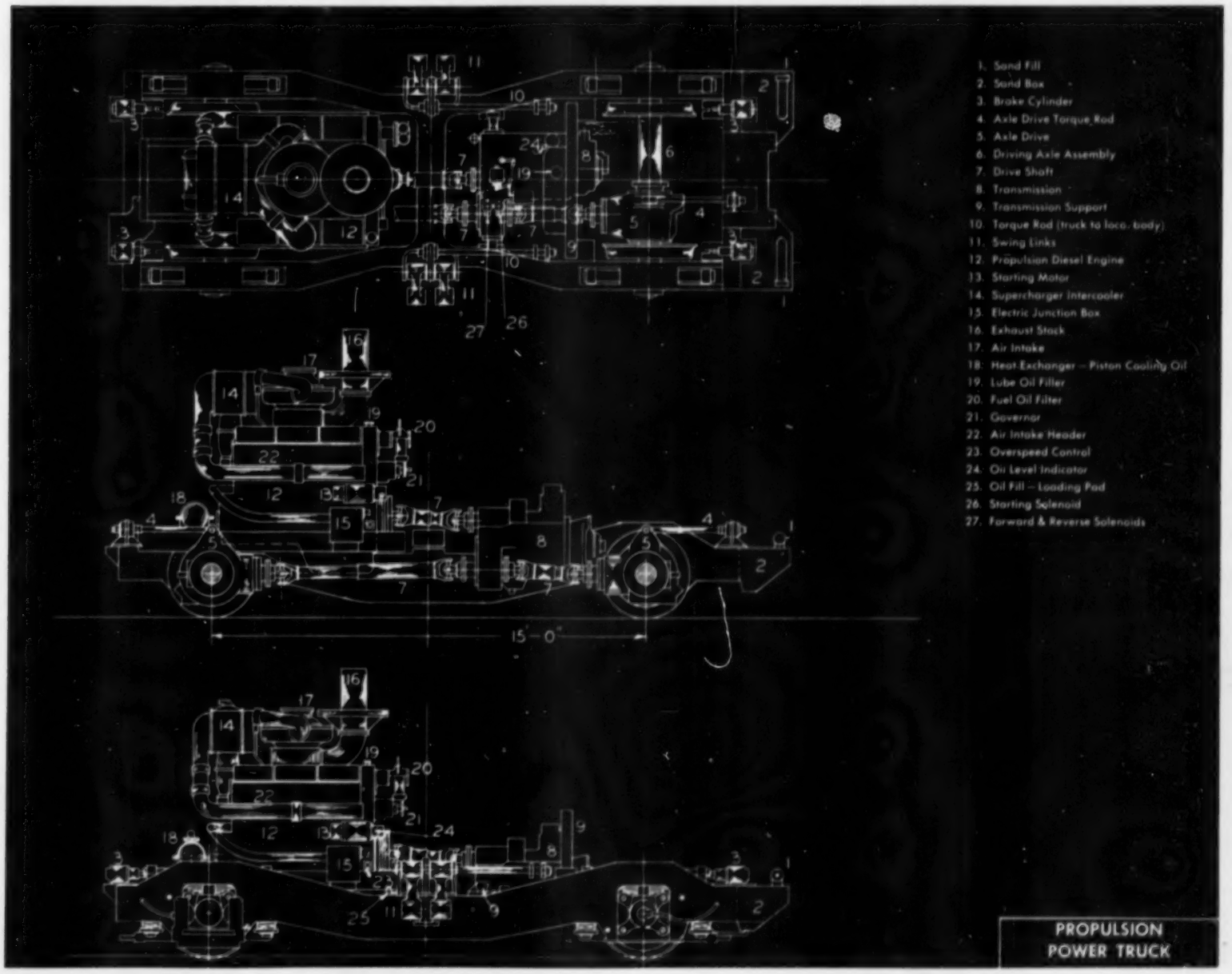
can railroads but well known in Europe. Conspicuous departures from conventional design in this country are the vertical turbocharger mounted in the V of the engine, the use of supercharger intercoolers and noticeably shorter dimensions. It is referred to in Europe as the *tunnel* engine because the crankcase combines the frame and bedplate in one piece and is designed to use large diameter anti-friction bearings. The crankshaft has solid disc webs which are used as inner races for the roller main bearings. Of interest is the fact that this crankshaft gives substantial support for the bearings, provides greater width for crankpin bearings and permits closer cylinder spacing. It is said that the crankshaft design reduces torsional vibrations while the engine is given exceptional stiffness by the monoblock type of frame and bedplate. Connecting rods are of fork-and-blade construction with bearings of split shell type, steel reinforced with copper-lead bearing surfaces. Proper bearing alignment is given by serrating edges of each half of the bearing for a perfect fit.

A spherical combustion chamber in the center of each cylinder head has a connecting throat of heat resistant steel large enough to eliminate the gas pressure drop commonly associated with pre-combustion chamber design. A unit type combination fuel injection pump and injector is centrally located in the cylinder head with nozzle projecting into the combustion space. The nozzle is leak-proof and has a relatively large hole which does not clog easily. Worm drive connected to the governor control mechanism provides injector control. Each cylinder has three intake and three exhaust valves arranged in a circle around the combustion chamber in order to lighten the load per valve on the operating mechanism and reduce heat dissipated through valve stem and seat. Each cylinder bank has two camshafts supported in bearings installed in a removable valve gear frame running the entire length of the engine. One camshaft is for exhaust and one for inlet valves. Hydraulic valve adjusters are used to prevent valve pounding.

The pistons are two-piece heat treated cast iron, cam ground with removable forged steel crown and there is a separate lubricating oil system for piston cooling. The rings are carried in the steel head with very low clearances and are said to be quite clear of the problems of sticking. Liners are cast iron, and water cooled, of course. They are supported top, bottom and middle for reinforcement and improved alignment. To preclude water leakage into the crankcase, the liners have two sealing rings with a tell-tale hole drilled in the block.

There are three separate lubricating oil circuits; one for piston cooling, one for valve gear and one for the major working parts and there is a pre-start arrangement to insure full lubrication before starting the engine. The governor is of hydraulic type. Turbocharger system is pretty much conventional, although the air is cooled before it is delivered to the cylinders. This improves volume and has a pronounced cooling effect on the valves and pistons in the engine.

The axle drive housings are of heavy cast steel construction for protection against external damage and to provide maximum support for the gears. Gears and pinions are spiral bevel with the pinions supported on both sides by oversized anti-friction bearings. Forced feed lubrication of the gears and bearings in either direction of operation is provided by an integral gear type pump. This arrangement eliminates the need for waste-packed lubricators. Torque reaction of the axle drives is absorbed by strong torque reaction members supported on the truck frame by heavy duty rubber cushioned snubbers. Drive shafts between engine, transmission and axle drives are equipped with flange connections for easy removal while the universal joints, giving complete flexibility of movement, are equipped with sealed roller bearings.



PROPULSION
POWER TRUCK

This Yellow Transit unit, having passed through the safety lane, completely serviced with windshield washed, is now ready for the regular driver.

YELLOW Transit's fleet of 210 Kenworth CBE tractors with 175 hp 6 cyl Cummins JT-6-B diesels, representing a complete change-over from gas to diesel early this year, is now breaking through the first 100,000 mile barrier with flying colors. High-mileage engines have been spot checked by factory engineers, viewed by experts, miked by maintenance men, and otherwise measured and analyzed from every angle, and what so far has been found indicates that these diesels are destined to hang up some impressive records—records that will be a tribute to the use of economical diesels in heavy duty over-the-road freight hauling and a tribute to the extra efficiency of the maintenance program as set up by Bill Riley, maintenance superintendent and carried out under the supervision of E. M. McClure, foreman of the main shop at Baxter Springs, Kan.

Bacharach fuel pump testing machine is one of the pieces of equipment being installed in a special glassed in room where unit overhauls will be made. Injectors, pumps, generators, voltage regulators, and many other items will be inspected and serviced.

A spot check on a unit with 85,000 miles service, pulling high-cube trailers from San Antonio, Texas, to Detroit, Michigan, carrying 48,000-pound GVW loads at 7 miles per gallon, showed no appreciable wear on its shell type connecting rod bearings, no scores and no acid etch marks and none on rings and valves. All measurable wear found has been far below replacement standards. No engines have been overhauled although the new central shop at Baxter is rapidly being equipped for complete overhauls, rebuild and overhaul of engine components of all types.

Changeover from gasoline to diesel with a clean break represents major changes. Yellow Transit Freight Lines, which has its headquarters in Kansas City, virtually threw away all its maintenance forms, data and experience as applied to gasoline rigs, and built a new maintenance system, elimi-

E. M. McClure, shop foreman, main shop, Baxter Springs, Kansas, checks performance of each unit and thorough records are kept of each adjustment and service job handled in the shop.

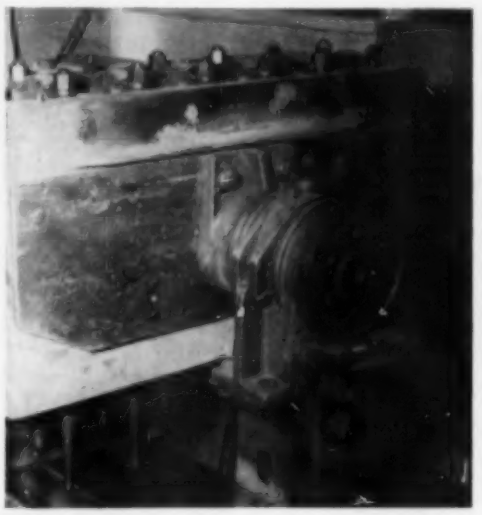
nated half a dozen road shops or more, and established its main shop in Baxter Springs, where it is the biggest business in town. Results of its new maintenance program have been highly satisfactory as the 100,000 mile tests are showing. Oil changes were made during the first few months at 3000 miles. As the engines worked into the load and the maintenance program was geared closely to the units, oil changes were moved up to 6000-miles average. A crew of 25 experienced mechanics man 13 stalls in the new shop, through which the whole fleet passes at regular intervals.

All low power complaints from drivers as well as work indicated by the preventive maintenance program, gets the tractor a test on a new Clayton dynamometer. Each mechanic carries his own test through the machine, revving the motor and watching the dynamometer dials from the driver's seat. Even speedometers are checked on the dynamometer. Shell Oil Company's ADC oilprint analysis program was adopted from the beginning, with marked low cost in PM time as well as reducing the cost of oil, since no useable oil is drained and contaminated oil carrying a load of undesirable contaminants is drained before damage occurs.

Yellow Transit's own original preventive maintenance program provides for check operations at 3000, 6000, 12,000, 24,000 and 48,000 miles, with some of the lower mileage operations automatically rescheduled in the larger mileage checks. Some of the 3000 mile operations include draining sediment from fuel tanks and filter, checks for oil, fuel and water leaks, recording oil pressure at idle and 2500 rpm with the record showing engine temperature, inspection of turbocharger for leaks and loose nuts, tightening manifold nuts, checking condition of coolant, checking cap screws in fan hub, and checking drive chains. At 6000 miles the 3000-mile check is repeated and fuel pump screen is cleaned, fuel filter changed, wiring inspected, generator and starter brushes inspected, water pump greased, valves and injectors adjusted, oil loss at rocker levers checked and the engine is checked for blow-by. At 24,000 miles these additional checks are performed and recorded: thermal controls, crankshaft and clearance, air compressor breather cleaned, commutators on starters and generators cleaned, air cleaners changed. The 48,000-mile check gets all the other checks and then injectors are cleaned, fuel inlet screens cleaned, crankcase is flushed, radiator is flushed, engine is steam cleaned, and all bolts and nuts are tightened.

One of the newer innovations in PM is the chemical check given the coolant in the radiators. This test is performed in the shop with a chemical kit and is designed to detect water which has been contaminated with minerals or other matter from the various stops on the road and which may damage engine or radiator. Any coolant found other than neutral is immediately reduced to a neutral state. Other work on the unit at the same mileages concerns chassis and wheels, transmissions and differentials. Engine stands were converted for the new engines by making a new plate to fit the Cummins diesel engine block.

Engine stands already owned were revised with a steel plate to fit the Cummins block.

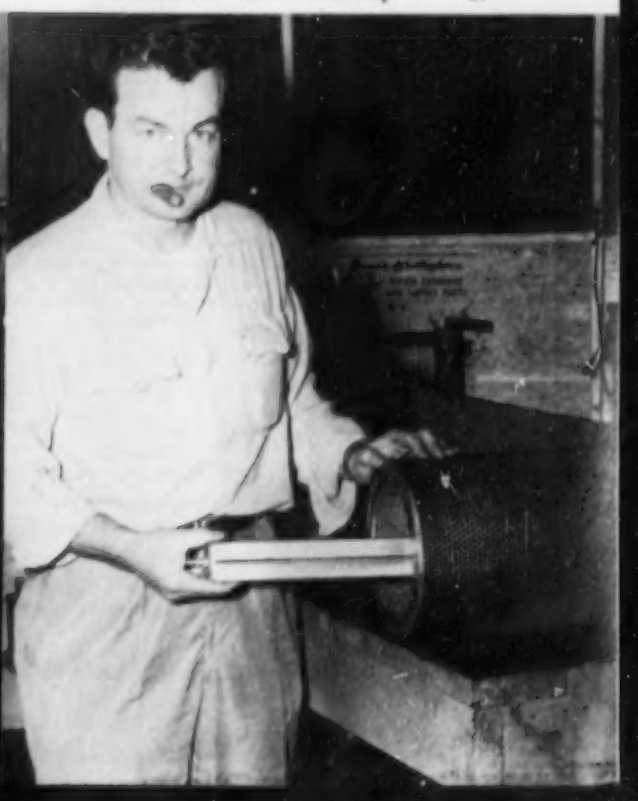


Purolator dry air cleaners are used and a method of cleaning these air cleaners by reverse flow of air has been devised. A long nozzle has been constructed of welded aluminum (the shop is equipped with Heliarc aluminum welding equipment for repairing aluminum trailers) with a long slot the length of the air cleaner core and air under high pressure will be discharged through the cleaners in a reversed flow from normal. The central shop is equipping a special room for injector maintenance, fuel pump testing and maintenance, and other component part renewals.

When Yellow Transit changed from gasoline to diesel many in the industry predicted complaints from drivers. In actual practice the drivers have had nothing but praise. Almost the same trouble was also predicted in acquiring a crew of experts to service the diesels. Requirements and standards at the main shop are high but the force of 25 highly skilled mechanics which now compose the mechanical staff, has been trained under expert diesel engineers as well as under the guidance of Bill Riley, maintenance superintendent, himself a diesel veteran, and his efficient general shop foreman, E. M. McClure. The results at the 100,000-mile-post are evidence enough that the system of PM is efficient and that each operation is being carried out with meticulous care and understanding. And no fleet, no matter how large, or under what difficulties they are required to operate, need now have any fear of a complete changeover to diesel.

Each mechanic handles his own tests on the Clayton dynamometer. Here a unit is being tested while mechanic watches dials from his position behind the wheel. Variable loads can be placed on the engine in the dynamometer test.

E. M. McClure, shop foreman, demonstrates nozzle which will be used to direct a reverse current of air through dry air cleaners to clean them. The nozzle is of welded aluminum and was made in the Yellow Transit shop.



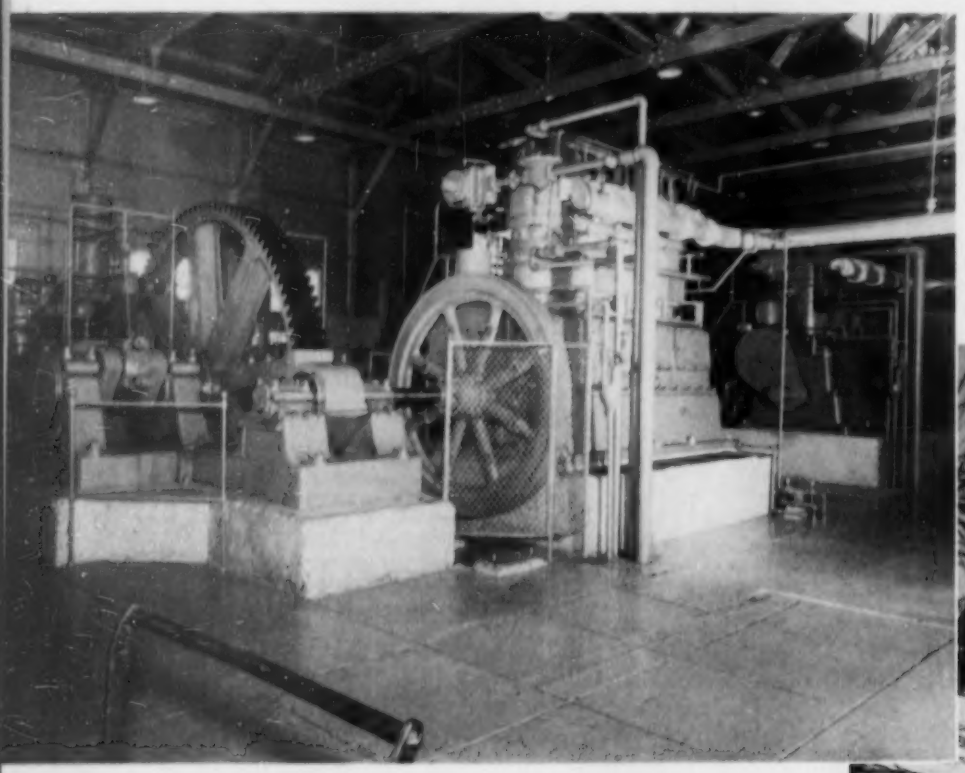
AN OLD TIMER'S EULOGY

Some Fine Old Fairbanks-Morse Engines and Pumps at Western Water Company in Taft, California, Are Approaching The 50-Year Service Mark, and They Still Have A Long Way To Go.

IN six short years, Western Water Co., of Taft, California, is going to celebrate its Golden Jubilee. Incorporating back in 1911 to supply water to the 750 people of newly-organized Taft, the company's men and the machinery that pumps water from the region's water table have lived and worked together through the years. Mr. W. A. Howell, President of Western, has been with the company since its beginning and Manager Beecher Rintoul for 38 years. Practically the entire staff has grown up with the organization as have some Fairbanks-Morse Type RE 14½ x 18-in. spark-ignition, natural gas engines. Operating from 50 to 60% of the time, the nine engines have worked a combined total of more than 2,000,000 engine hours driving more in 1926. But the men who grew up with them learned how to keep them running: all are in full service, and the end of their useful life isn't in sight yet by a long way.

Before Western was formed in 1911, water was being hauled into Taft in tank cars by train. Taft was boom town in that era. Oil well derricks dotted the countryside and gushers were coming in all the time. But Western drilled for water. It was almost as valuable as oil and, since the southern part of the city had burned down by that time, equally as important to the future of the city. Western began with two pumping stations. No. 1, with the original wells, was built 12 miles northeast of Taft, north of Buena Vista Lake, and No. 2 was built at Taft. However, the operations of two large oil companies in the area swelled the population, created new communities and increased the industrial need for water, so the company built Station No. 7 three and one-half miles north of Station No. 1, and drilled new wells.

Today, five wells are in service at Station 7 with equipment operated by remote control from Station 1. Well water is pumped from Station 7, where surface elevation is 290 ft, through 3½ miles of 30-in. pipe to surface storage tanks at Station 1 at an elevation of 295 ft. The six pumps at Station 1 send the water through 9 miles of 16-in. line, then double 12-in. to the top of a 1025 ft range of hills after which it flows by gravity through 1½ miles of 20-in. line and 3000 ft of double 16-in. pipe to Station 2 at 1000 ft elevation. The six pumps at Station 2 supply Taft, most of the oil fields, and other communities in a 50-square-mile area with 20,000 inhabitants. Since Western is lo-



Three of the four Fairbanks-Morse Type RE, 4-cylinder, gas engines, installed in 1911, have driven F-M 9 x 18-in., 600 gpm horizontal displacement pumps at Station 1 for nearly half a century.

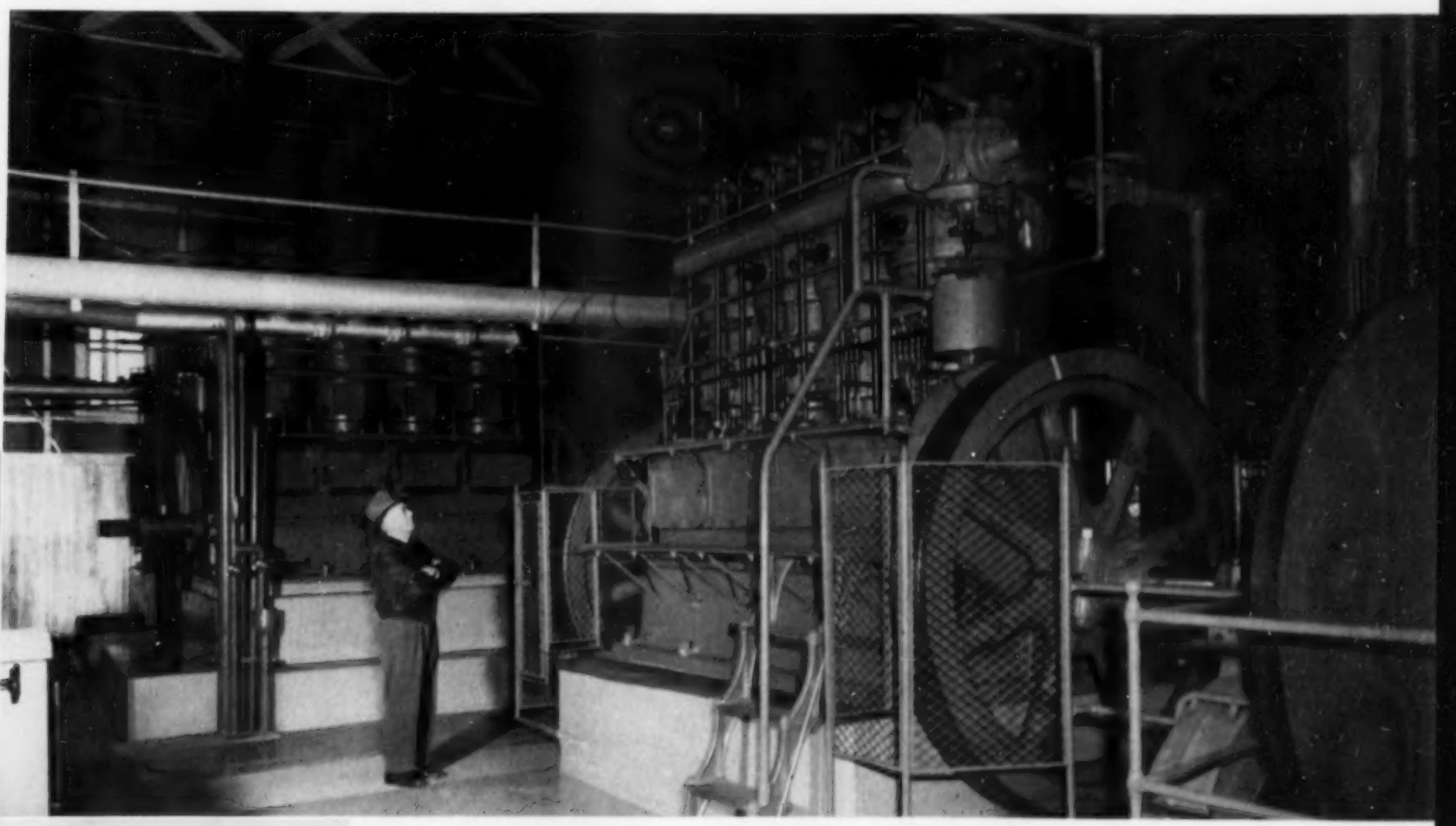
Western Water Company's Station 2 is located at city of Taft, California, approximately 12 miles southwest of Station 1. Three natural gas engines, installed in 1913, 1918 and 1922, still drive pumps handling water supply for city, neighboring communities and oil fields.

Western's pumps and, like the men who run them, they're still going strong. Needless to say, the engines have outlived what is referred to on the audit books as their useful life. Two of these F-M engines went into operation in 1911, one in 1912, another in 1913, one in 1918, two more in 1922 and two

cated among the oil fields of southern California, oil production terminology prevails in the water company. Thus, water is measured in barrels instead of gallons. The five wells at Station No. 7 produced 20,680,000 bbl. in 1954, or 868,560,000 gals. for domestic and industrial use, and, except for some delivered to areas adjoining Station 7 and 1, all the water had to be pumped three times. Station 1 began operations in 1911 with various Fairbanks-Morse engines, and a few years later with one 80 hp Type RE, two 190 hp Type RE, and one 135 hp Type RE, Fairbanks, Morse & Co. natural gas engines, driving deep well pumps. In addition two 250 hp Type RE Fairbanks, Morse & Co. natural gas engines were installed in 1911 for pumping water to Taft. These engines are direct connected to two 600 gpm 9x18 Fairbanks-Morse horizontal displacement pumps. (Two of the 190 hp units were moved to Station 7 in 1926 and continue to provide power for well pumps.) A third 250 hp Type RE gas engine was added to Station 1 in 1912 to drive another F-M horizontal displacement pump and a fourth in 1922 to power an 8 x 12-in. 650 gpm Aldrich vertical quintuplex pump. All four pumps are rated at a discharge head of 550 psig. Today the station also contains a 1300 gpm vertical quintuplex pump driven by a 500 hp gas engine, a 425 gpm vertical quintuplex driven by a 150 hp electric motor and a pair of 6-stage, 600 gpm centrifugals driven in compound by two 150 hp motors. Since the equipment in this station is in operation an average of 65 percent of the time, it is estimated that the original Fairbanks-Morse engines have rolled up more than 250,000 engine-hours each.

Station No. 2 operates three Fairbanks-Morse Type RE, 4-cylinder, 250 hp vertical natural gas engines, one installed in 1913, the second in 1918 and the third in 1922. They drive three 8 x 12 vertical quintuplex pumps rated at 750 gpm each, one belted and two direct-connected to the F-M gas engines. This equipment supplies two 55,000 bbl. tanks at an elevation of 1650 feet two miles south of the station for the use of oil fields in the vicinity. A single-stage, 500 gpm centrifugal pump, driven by a 50-hp motor, and a single-stage, 800 gpm centrifugal pump driven by a 50-hp motor, pump directly into the distribution lines for the city of Taft. Another F-M 50-hp motor drives an F-M centrifugal pump that takes water from the transmission line before it reaches Station No. 2 and supplies a section of Taft adjoining the line. In this station, too, the original gas engine will soon reach a quarter million hours of operation. There is still another veteran gas engine in Station 2, a Type T single-cylinder Fairbanks-Morse unit rated at 9 hp at 350 rpm. Installed in 1913, it does double duty driving both a 5½ kw Fairbanks-Morse generator and an air compressor.

At Station No. 7, the 190 hp F-M gas engines drive two of the five deep well turbine pumps, one rated at 2400 gpm, the other at 1200 gpm. The Station also has an 1100 gpm gas-engine driven pump and two motor driven units rated at 2800 gpm and 750 gpm. On the average, each piece of equipment is in service half the time and two F-M engines must be near 200,000 hours of operation. The 10



Manager Beecher Rintoul, who has been with Western Water Company for 38 years, knows every detail of F-M Type RE, 4 cylinder, 14½ x 18, gas engine, rated 250 hp at 250 rpm, he is inspecting at water company's Station 2. The three engines seen in this view were installed in 1913, 1918 and 1922.

to 25 years of additional useful life the operators have realized from Western's equipment over and above the accepted 20 years is standing proof of the durability of the engines and also shows that they have solved the secret of long-range maintenance. Considering the age of the engines, the

maintenance record is notable. Operators watch lube oil consumption and check over an engine when lube consumption rises. Normally, bearings are inspected and the bronzed stemmed, stellite-faced valves ground once a year. Pistons are pulled on an average of once in eight years.

The operators have the skill and equipment to do all their own maintenance work and actually re-metal bearings and re-bore cylinders. The latter jobs are few and far between. At Station 1, one 1911 unit was rebored in 1935 and a cylinder replaced in 1951. Another 1911 engine was rebored in 1922 and 1940. The 1912 unit was first rebored in 1953. At Station 2, the 1913 engine was rebored once in 1938 and the 1918 engine once in 1930. Lube for each engine is in continuous circuit going from sump to pump through a waste packed filter and up to an overhead tank, then through a second filter to the engine. Lube is also batched through a centrifuge periodically. Gas and air are mixed in accordance with a manual setting, pressure being controlled by an F-M fly-ball governor. Originally make-and-break ignition was used in the engines, now each unit has a high tension magneto. Spark plugs last at least a year. The pioneer natural gas engines in Western Water Company's three pumping stations have achieved a notable record for durability and dependable service. Undoubtedly they will be superseded some day by modern high-compression gas engines, but the veteran prime movers have written a chapter in the history of internal combustion engines.

List of Equipment

Main engines—Fairbanks, Morse (7) Type RE, 4-cylinder, 14½ x 18, vertical natural gas engines, rated 250 hp at 250 rpm. (2) Type RE, 14½ x 18, natural gas engines, rated 190 hp at 250 rpm.

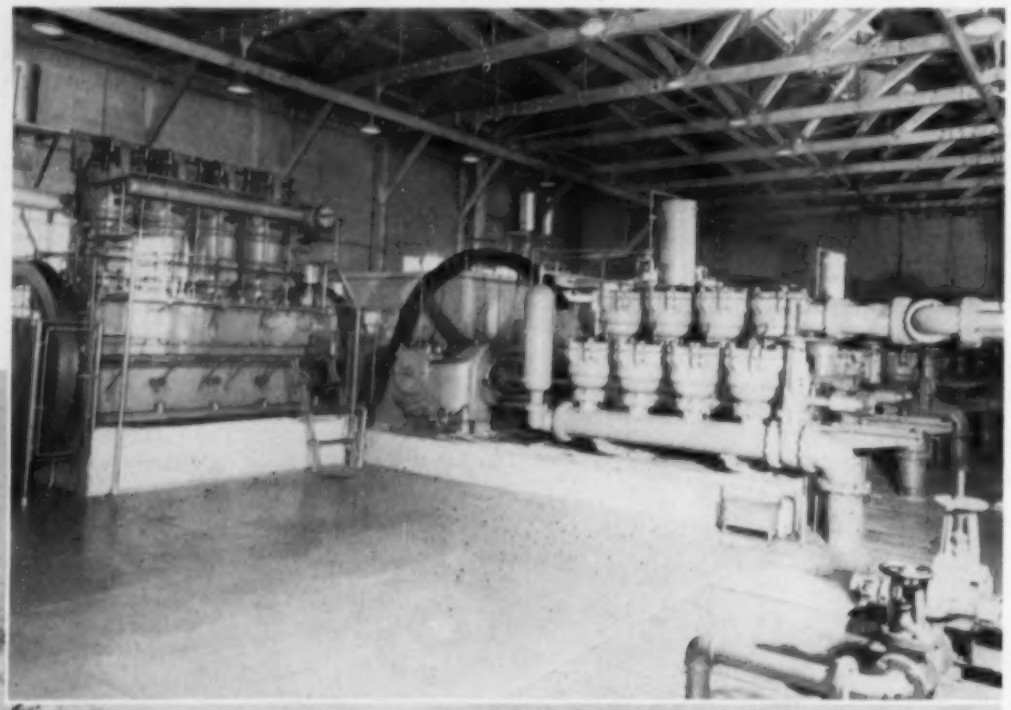
Magnetos—Bosch.

Oil rings—American Hammered.

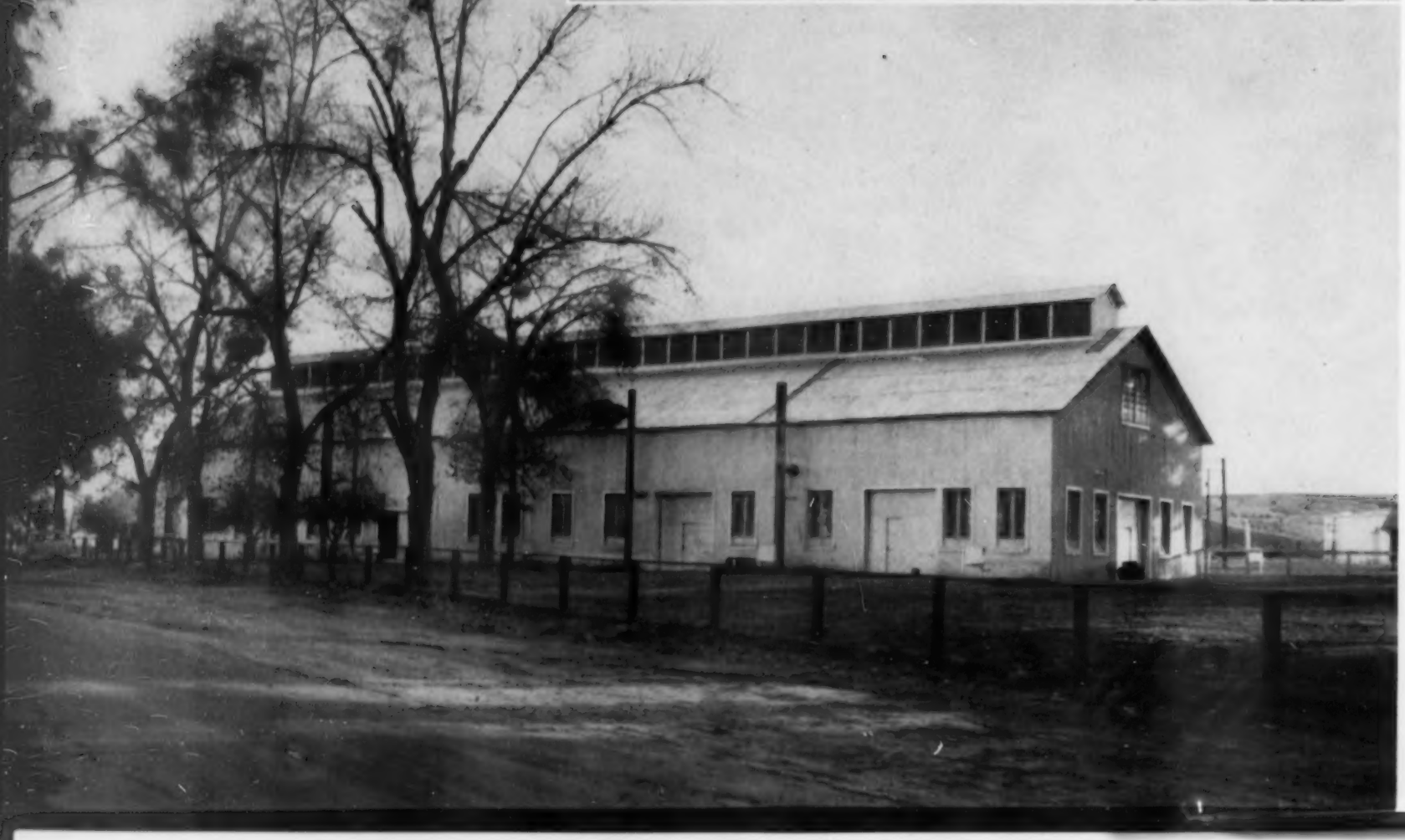
Fuel gas—Southern California Gas Co.

Lube oil—Standard Oil Zerolene. Texas Altair.

This Fairbanks-Morse Type RE engine installed in 1911 drives a 9 x 18-in. F-M 600 gpm horizontal displacement pump at Station 1. Old but still highly serviceable, the equipment requires little maintenance from staff who grew up with units.



Old-timers of Western Water Company of Taft, California, operate four Fairbanks-Morse Type RE, 4-cylinder, vertical natural gas engines at the water company's Station 1, built in 1911.



DIESEL TUG BUILT FOR DURATION OPERATION

By A. D. BURROUGHS

The new tug, *Andrew J. Higgins*, is designed for profitable duration operation with the 9,000 gallon fuel, 260 gallon oil, and 2,000 gallon water capacity. Cabin and hull shown here are designed to enable the eight man crew to reach any part of the craft from engine room to pilothouse without going on the deck.

THE new tug, *Andrew J. Higgins*, unusual in its cabin and hull design, as well as its excellent operation duration, will continue the name of the man who has made contributions to marine history through the famous landing craft, PT boats, and other marine craft during World War II, and will serve in Southern inland waterways and in off-shore Gulf service. Built by the company founded by the tug's namesake, Higgins, Inc., New Orleans, the *Andrew J. Higgins* is owned by Maximilian and Voorhies Cheramie and Edmond Orgeron of Harvey, Louisiana.

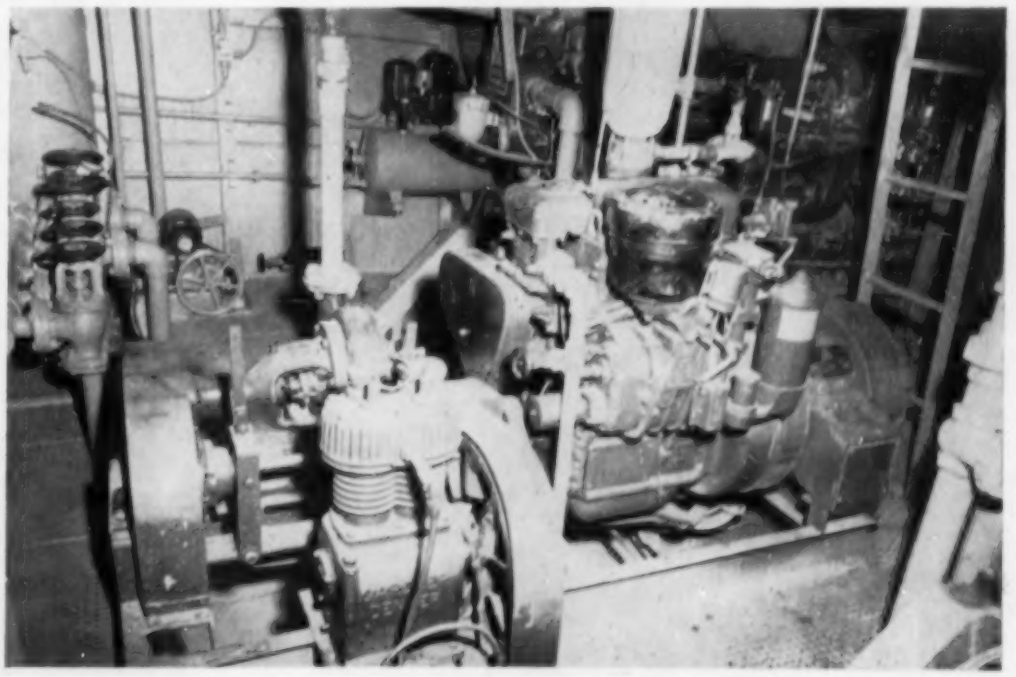
Typical of the new trend in boat construction, this craft is designed specifically for the waters where it will perform. Measuring 64 ft 6 in. in length, with a 20 ft beam, an 8 ft 6 in. depth amidships, drawing 6 ft 6 in., this new tug contains many unusual features for a craft of its size. One of the first features noted when we saw the tug launched by Mrs. B. J. Wood, wife of the marine surveyor, is the power provided by the twin GM diesel engines, Model 110, with 3.75 reduction gears through Coolidge propellers.

The owners of this new unusual craft report that this diesel propulsion produces 11 knots, when the vessel is fully loaded. It has a bollard pull of 16,000 lbs at 1600 rpm. Other equipment includes 20 kw dc auxiliary, combination firepump and compressor of General Motors units; the 10 kw dc constant voltage, variable speed generator, driven off the front end of one of the GM diesel engines. Both generators are connected into a 110 volt battery system. The steering for the *Andrew J. Higgins* is by rod and cable, with the deck equipment supplied by the owners.

Perhaps the feature drawing the largest interest for this new craft is the amazing and profitable operation duration, rated as one of the highest if not the highest, for a craft of its size. This vessel is equipped for her profitable duration operation, far exceeding most tugs in this size range by the 9,000 gallon fuel capacity, 260 gallon oil capacity, and 2,000 gallon water capacity, adding up to the utmost in power and duration profits for her owners. The labor section on the inland and Gulf waters were expressing great interest in the unusual cabin and hull design. One of the few of its type at work, this practical design is planned for greater work economy, more safety and weather protection for the night-man crew operating this new tug. Through the design planning, any member of the crew can go anyplace on this new tug, from engine-room to the pilothouse without going on the deck, a feature well appreciated by diesel folks familiar with off-shore Gulf operations.

Now at work with the fleet of boats in operation in the Southern waters and in the Gulf for the owners, Maximilian and Voorhies Cheramie, and Edmond Orgeron, this new tug is living up to the expectations of carrying on the honor of the respected name of *Andrew J. Higgins*. Through practical design for operational duration and with dependable diesels providing propulsion power, this tug will make reliable profits in the years ahead service in Southern waters.

Engine room of the *Andrew J. Higgins*, equipped with twin GM diesel engines providing propulsion power. It is rated at 11 knots fully loaded, for operation in Southern inland waters and for offshore Gulf service. GM diesel driven 20 kw auxiliary generator, fire pump and compressor combination unit is in foreground.



ALLISON TC-500 SERIES TORQUE CONVERTER

Electronic Computer and Flow Studies Play Key Part in Development of New Widely Adaptable Torque Converter.

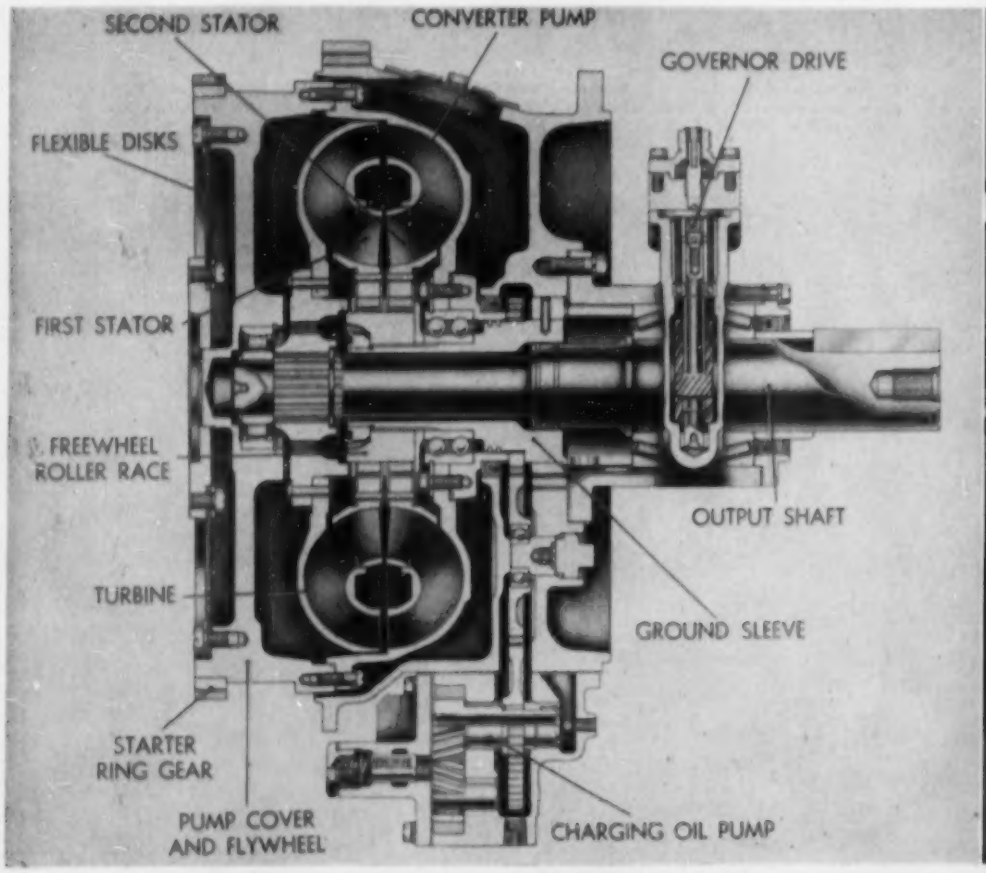
ELECTRONIC computing machinery and intelligent peeking into the converter torus have contributed greatly to advancement in torque converter design and development at the Allison Division of General Motors. Electronic computer and flow studies have combined to produce a new Torqmatic converter that has reached a new high level in mechanical simplicity. Its design was carefully planned, not only from an engineering and production point of view, but from the standpoint of the ultimate user as well. It features a useful concept in torque converter development by making available to the customer several capacities with low and high torque ratios in each range with same diameter torus of the converter.

In the development of this torque converter, the electronic computer has assisted the design engineer by taking over repetitive calculations that he laboriously performed manually before the advent of this electronic brain. It has allowed him time to explore configurations that were never possible with the slide rule. The reason is the breath-taking speed with which the computer works. For example, if an engineer wanted to examine several possible designs for a new torque converter product, the electronic computer would allow him time to investigate, in the course of a normal development period, 25 configurations compared to one combination that he formerly was able to explore by using the manual methods. This equation automation has given the Allison torque converter engineer better and faster means of handling converter design calculations, thus making possible many refinements to the new Allison Torqmatic Converter.

Another large factor contributing to the improvement and design of this converter is the flow studies that Allison engineers made with their new test equipment designed specifically for peeking into the converter torus to watch the effects of irregular wall surfaces in passages, radical changes in direction, and diverging passages with poor control of fluid direction, upon the oil flow. Also, this same equipment was used to study vane design and its effect upon the flow pattern. Before Allison developed this unique flow chamber to study torus flow conditions, torque converter improvement was accomplished by testing the complete converter in a dynamometer laboratory. It was impossible to obtain knowledge of the characteristics of each converter blade, independent of the effect of succeeding elements. This method of gaining improvements in new converter products was slow, expensive, and limited. But now, with this new flow column, it is possible to conduct isolated testing of converter blades and passages before building the complete torque converter.

The test chamber is designed to accept adapters for the test samples. Transparent windows on the test chamber permit viewing and photographing the flow pattern. A record of the flow pattern is made by the use of high-speed photographic equipment. Both static and dynamic pictures are taken to record the changes in flow pattern due to blade modification. So with the use of this flow chamber, the converter engineer was provided with a basis for improved efficiency and capacities through determination of optimum conditions of vane shapes as

Cross-section of Allison TCA-555 Torqmatic converter with industrial shaft and accessory drive. All models of the TC-500 series are available in one standard housing. A broad range of absorption capacity is made possible by changing only the converter pump and/or first stator.



The electronic computer and its intricate wiring can be seen here. This computer takes over repetitive calculations that were previously laboriously performed manually and saves many man-hours of valuable engineering time.

well as directional control of oil stream and flow patterns within the converter.

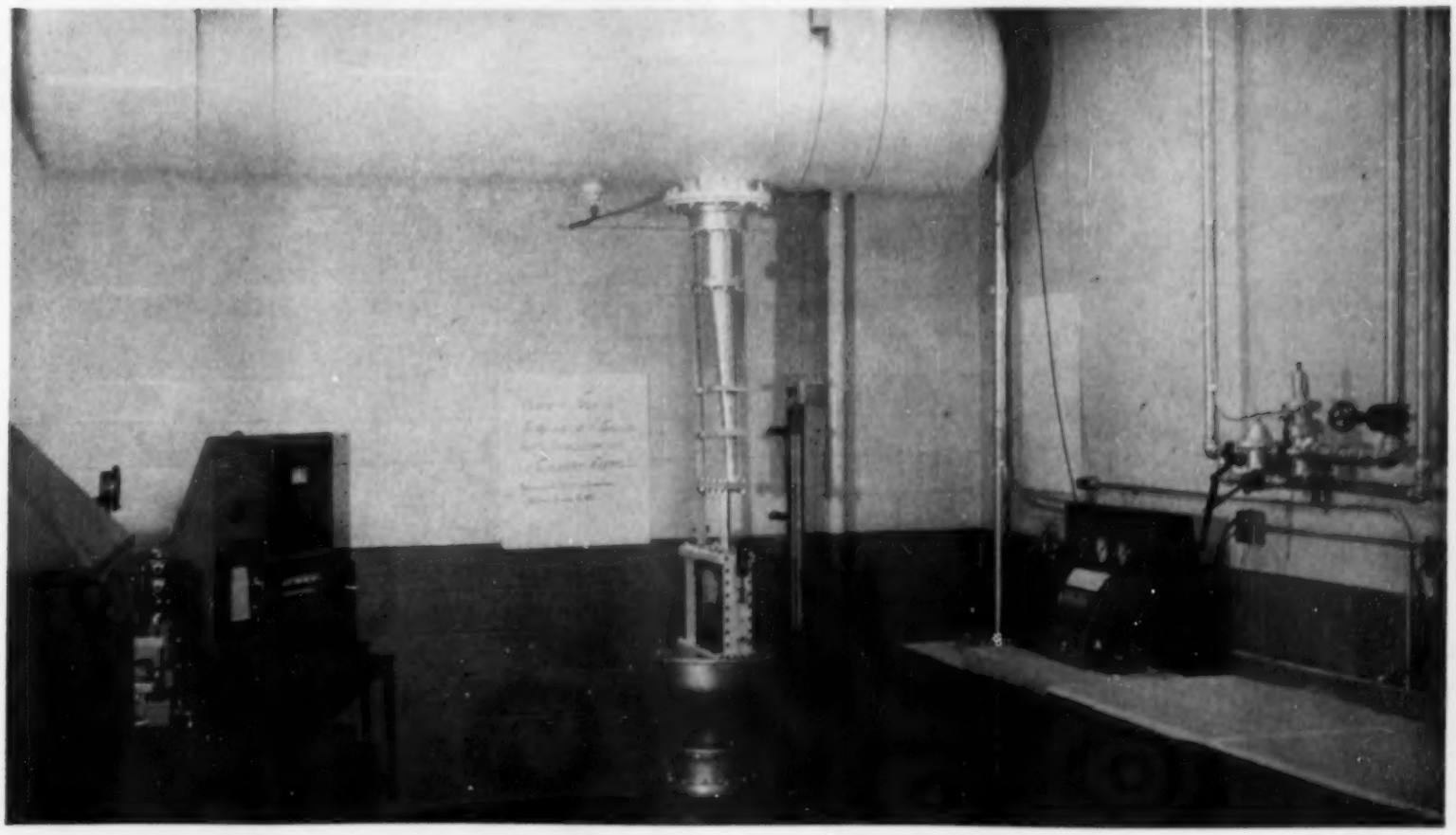
To fully realize the important nature of the contribution of these new tools—the electronic computer and flow chamber—to the design of Allison torque converters, it is only necessary to take a look at Allison's new TC-500 Torqmatic Converter. The usable performance range at high operating efficiency has been gradually improved. This continual expansion of the operating range since the introduction of Allison converters has permitted greater flexibility in the design of Torqmatic Drives. Also, the continual improvement in the performance characteristics of the converter emphasizes the importance of selecting a converter that will give the most desirable output performance when matched to a given engine for a certain application. Sometimes the installation will require a high starting torque and maximum horsepower in the lower speed range; another type of application may need low starting torque but maximum horsepower in the high speed range. So the TC-500 Torqmatic Converter provides four different converter capacities, each class having optional high or low torque ratios for matching to current engines for the principal types of applications of their engines.

Other options are also available with this new TC-500 Torqmatic Converter. A direct-drive lock-up clutch may be desirable to lock the converter out of the power train during certain parts of the duty cycle. Located inside the flywheel for compactness, this clutch locks the converter pump to the turbine when engaged hydraulically through control valve operation. Additional features are manual input-disconnect clutch which permits work to be done on the equipment while engine is running; automotive and industrial output shafts; and tail shaft governor drive which has opened the door for many converter applications never thought possible before. One of the many optional original features is the Torqmatic Brake, a hydraulic retarding unit for automotive type applications, which assembles directly to the back of the converter housing. It provides continuous dynamic braking on steep grade operation and saves service brakes for complete stops, or just for snubbing on the curves of the roads.

ALLISON 500 SERIES TORQMATIC CONVERTER
GENERAL SPECIFICATIONS

Model TC	520	530	540	550	560	570	580
Stall Torque Ratio (Max.)	2.88	3.64	2.78	3.42	2.54	3.13	2.70
Max. Input Speed—RPM	2400	2400	2400	2400	2400	2400	2400
Max. Input Torque—Lbs. Ft.	850	850	850	850	850	850	850
Flywheel Housing—SAE	1	1	1	1	1	1	1
Type of Oil	Hydraulic Transmission Fluid, Type C						
Weight Range (Dry)	420 to 650 lbs. depending on Model						

Converter Flow Study Equipment shown below permits Allison engineers to determine optimum conditions of vane shapes as well as directional control of oil stream and flow pattern, therefore providing a sound basis from which to design and build torque converters of improved efficiency and capacities.

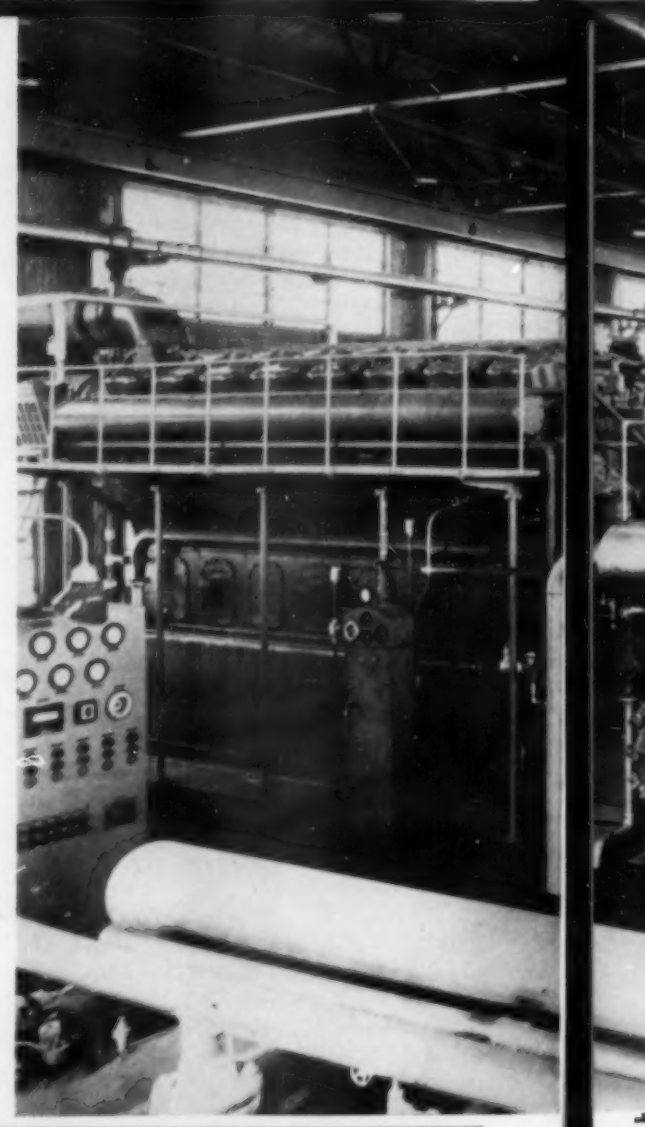


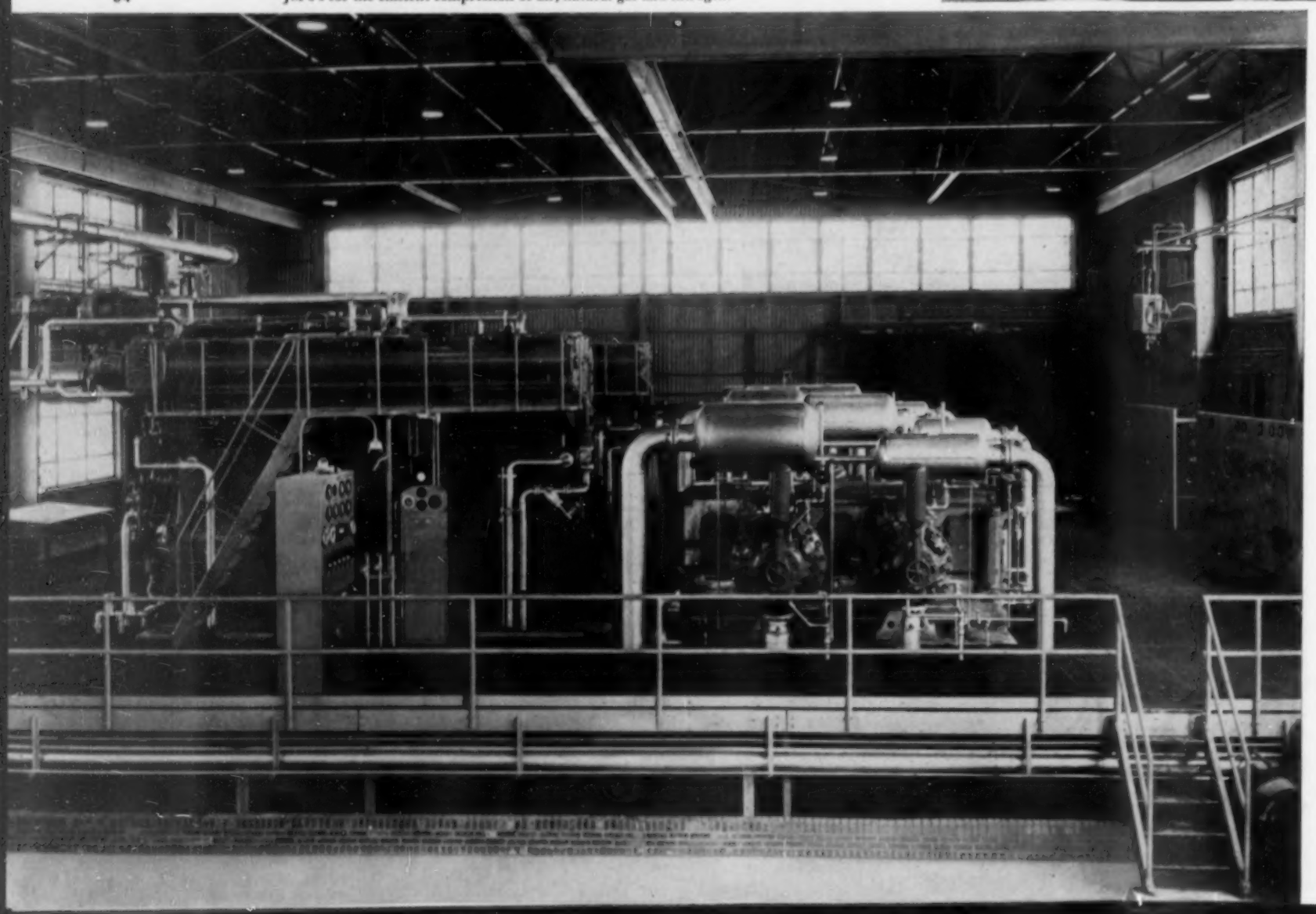
DIESELS IN CHEMICAL PROCESSING

LATEST technologies developed in compression of gas for processing fertilizers are bearing out original predictions for economy at The Cooperative Farm Chemical Association Plant in Lawrence, Kansas. Expectations are that these techniques herald what will be standard compressor practice in future ammonia processing plants. Believed to be the only compressor installation of its kind today, The Cooperative Farm Chemical Association operation combines the operation of compressing several gases into one efficient compressor unit. The resulting savings in floor space and foundation costs are surprisingly high over using separate compressors.

Each compressor is driven by an internal combustion engine that operates on either diesel fuel, natural gas or a combination of diesel fuel and gas. Considerable savings in power cost are estimated over similar type of equipment driven by electric motors, depending upon the location. Four compressor units handle the requirements for processing 180 tons of anhydrous ammonia daily. Two of the compressors are for ammonia synthesis, two are mixed gas compressors. In the synthesis of ammonia, the gas is compressed from pressures of 275 to 12,100 lbs per sq in. absolute in four stages using a Cooper-Bessemer type JM compressor unit. Each of the two compressors has eleven cylinders. There is one first stage cylinder, three second stage cylinders, three third stage cylinders, and four fourth stage cylinders.

Each of the two ammonia synthesis compressors is driven by a directly coupled Cooper-Bessemer type LS V-type 16-cylinder engine. Each engine is supercharged and develops 2537 hp at 240 rpm. Continuous, economical performance is being assured by using a 3-way fueling system developed by Cooper-Bessemer for these large engines. With the abundance of natural gas in Kansas, the engines can run most of the time as spark-ignited supercharged gas engines at economies as high as 6500 btu per hp/hr. Curtailment of power from possible restrictions in gas supplies during winter months is prevented by the engine's 3-way fuel system. Should gas supplies become limited, the engine can be quickly changed over to dual fuel operation. When operating as a dual fuel engine, the unit will automatically convert from dual fuel operation to straight diesel operation if the gas supply is further decreased or completely shut off.





This view of the C.F.C.A. plant in Lawrence, shows the two 8-cylinder LS engines driving JM-5's for the efficient compression of air, natural gas and nitrogen.

The two mixed gas compressors are 5-cylinder type JM Cooper-Bessemer units. Each compressor unit is driven by a directly coupled 1852 hp, 330 rpm Cooper-Bessemer type LS 8-cylinder engine. Air, natural gas and nitrogen are compressed simultaneously with individual compressor cylinders. Air is compressed from 120 to 630 lbs per sq in. absolute in two stages using two of the cylinders. A third cylinder boosts the pressure of natural gas used in the process from 115 to 430 lbs per sq in. absolute. Cylinders 4 and 5 compress nitrogen from 35 to 330 lbs per sq in. absolute.

Engineered and constructed by the Foster Wheeler Corporation, New York City, The Cooperative Farm Chemical Association operation is capable of turning out 83,000 tons of dry ammonia nitrate a year, 60,000 tons of anhydrous ammonia and 13,200 tons of nitrogen solutions. The ingredients, natural gas, air and water, are found right on the plant location. With its controlled equipment, the compressor installation can be operated efficiently at full and partial loads.

In the foreground are the Cooper-Bessemer LSV engines directly coupled to JM-8 compressors. In the background can be seen 8-cylinder LS engines coupled with JM-5 compressors. Engineering and construction of C.F.C.A. plant was handled by The Foster Wheeler Corp., New York City.

These two 16-cylinder Cooper-Bessemer LSV engines in the Lawrence Chemical plant total 5074 hp. They drive JM-8's for the compression of ammonia synthesis gas to 12,100 psia.

LARGE DIESEL EXCAVATOR

By ED DENNIS

THEY took a gamble—a $100,000 gamble. It was one man's dream and another engineered it. The result was one of the largest ladder type, side mounted excavators known. The dream belonged to M. B. (Barney) Waldin, who can always suggest a machine to do some impossible job, and who is the owner of a land development and rock excavating concern. The man who took that dream and made it a reality was Selden Stewart II, Professional Engineer, with years of experience in the design of special mechanical equipment. The idea was a means to excavate South Florida coral rock without the use of dynamite, which is expensive and objectionable, and also to cut down on the amount of equipment and manpower required in the excavation of this rock, thereby cutting down on the overall cost of production.

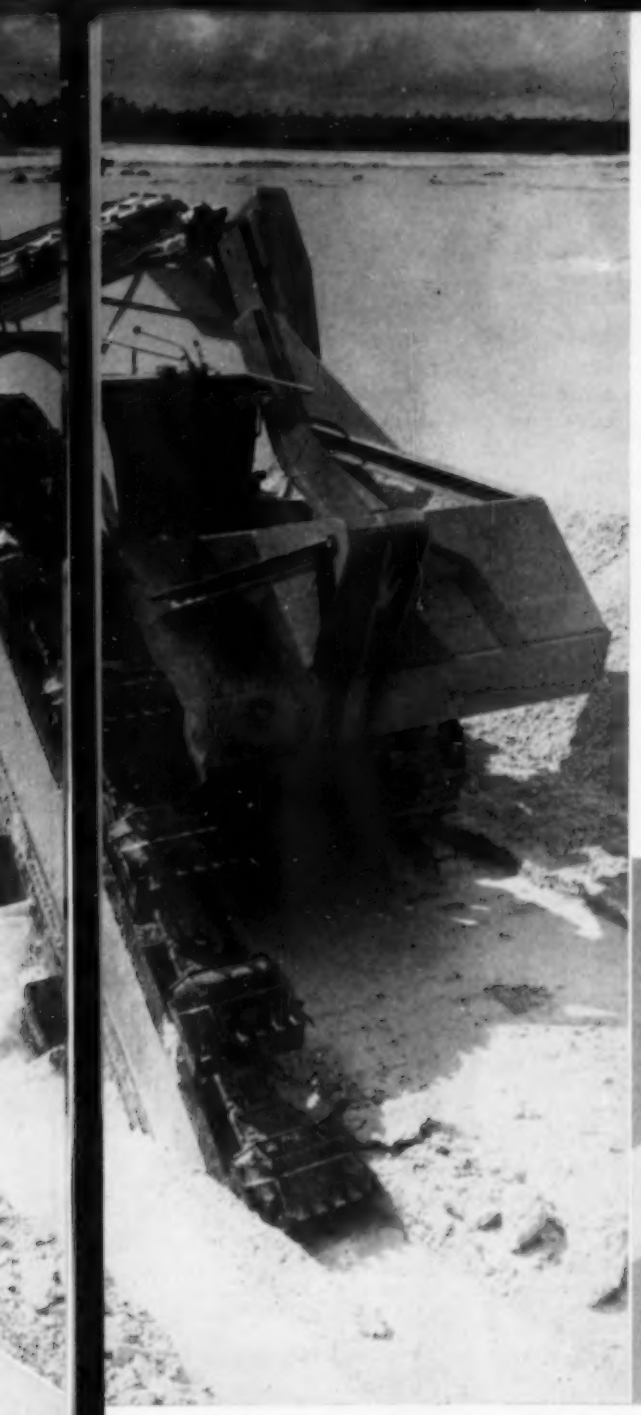
There are distinct advantages in the use of this new type excavator in a rock quarry, Selden Stewart proudly pointed out, as it was being put into operation at Naranja Rock Company's quarry. The old method of excavating coral rock required a drill and dynamite crew of 2 or 3 men, 2 dragline operators, an operator on a rock crusher, and a bulldozer operator to stock pile the crushed rock. The new method only requires one operator and an oiler on the excavator. Another feature is a smaller investment in equipment. This new machine brings up the rock in the proper size re-

The excavator on its way from the machine shop for its first trial operation at Naranja Rock pit.

When not digging the machine can attain the speed of a standard D8 Caterpillar tractor. Digging power is accomplished with a model D337 Caterpillar diesel engine rated at 250 hp. The engine drives through a Twin Disc torque converter, which is connected to a side stub shaft and a chain sprocket; a chain then conveys the power to the upper sprocket and shaft which drives the ladder and buckets. The digging ladder and frame weighs 15 tons and it is this weight that keeps it down in position for digging. Two 3 stage Hercules telescoping hydraulic rams are used to lift the ladder out of the excavating pit.

This new excavator was constructed in the shops of the Growers Equipment Co. at Homestead, Florida; the two D8 Caterpillar diesel tractors that were used for its construction were supplied by Shelley Tractor & Equipment Co. of Miami, who also supplied the model D337 Caterpillar diesel engine and the Twin Disc torque converter.

Randy Caves, Superintendent, standing beside the excavator.



This view shows the second conveyor belt. The crushed rock is dumped from this belt into trucks or stock piled for future use.

The huge ladder type excavator, shown in operation at Naranja Rock pit. The 28 cast steel buckets were manufactured by Florida Machine & Foundry Co. It digs a trench 18½ ft deep and operates within a foot of the side of the excavation.

quired for road construction and general fill work at the rate of 100 to 200 cu yd/hr, depending on the hardness of the rock being dug.

During digging operations the ground travel is accomplished with a 15 hp Vickers hydraulic motor driving through a separate clutch and a special transmission which has a gear ratio of 100 to 1. This drive is used only when digging. When the machine is not digging, ground travel is accomplished through 12 V belts which drive from a shaft out of the upper power take-off down and into the lower power take-off. While the hydraulic motor is giving the ground travel power, the belts are idle and turn free on the pulleys, then when the belts are driving, the hydraulic motor is disengaged.

NEW CUMMINS TURBO-CHARGED DIESEL

FOLLOWING three years of development and extensive field testing, Cummins Engine Company, Inc., announces the production and commercial availability of the new 335 hp Cummins NRTO-6 Turbodiesel engine. According to Cummins engineers, the high output of the NRTO-6 is made possible by the use of a new exhaust gas turbocharger manufactured by Cummins .This new turbocharger, designated by Cummins as the T-590, plus the Cummins PT Fuel System, give this engine its excellent torque characteristics. The NRTO-6 develops its 335 hp at 2100 rpm, with a 90 degree Fahrenheit intake air temperature from zero to 4,000 ft. The NRTO-6 is derated 1½ per cent for each 1,000 ft of altitude over 4,000 ft.

Compared to a naturally aspirated engine of the same cubic inch displacement the NRTO-6 develops 67½ per cent more power. Likewise, the NRTO-6 produces 11½ per cent more power than a mechanically supercharged engine of the same cubic inch displacement. The fuel rate is also lower than naturally aspirated or mechanically supercharged engines.

Comparison of Cummins 743 cubic inch engines shows:

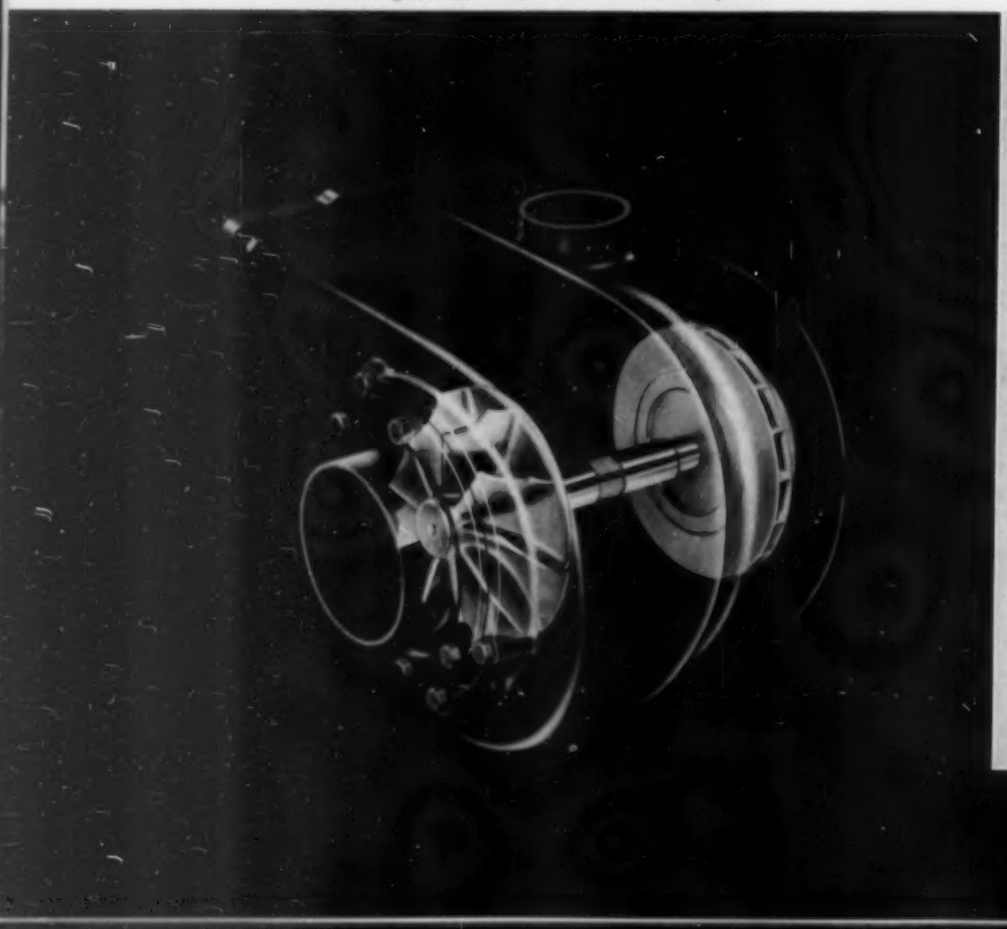
Model	Type	Hp.	Wt.	Fuel Cons. Lbs/hp.	Fuel Cons. Lbs/ bhp/hr.
NRTO-6	Turbocharged	335	2546	7.6	.423
NHRS-600	Supercharged	300	2786	9.3	.468
NH-600	Nat. Aspirated	200	2460	12.3	.440

The NRTO-6 was designed by Cummins to meet the increasing power requirements without increasing size or weight for all types of equipment, including off-highway haulage units, scrapers, tractors, shovels, cranes, power units, and heavy over-the-highway trucks. This Cummins Turbodiesel is a six cylinder, 4-cycle engine with a bore and stroke of 5⅛ in. x 6 in. and a piston displacement of 743 cu in. Compression ratio is 14.5 to 1. Key to the high horsepower available from the NRTO-6 engine is the Cummins turbocharger. Here, normally wasted energy of the exhaust gas is used to create power. This is accomplished by piping the exhaust through a turbine which is one element of the turbocharger. The exhaust gas is directed against the turbine blades causing the wheel to rotate at high speed. A centrifugal impeller, mounted on the same shaft, but in a separate housing, draws fresh air and blows it into the intake manifold and cylinders under pressure. More weight of fresh air is forced into the cylinders and a greater quantity of fuel can be burned completely, thus creating more power at the flywheel. Mounting of Cummins T-590 turbochargers on the NRTO-6 can be effected in three ways—rear, top or side, depending on the application requirements of various power users in the field.

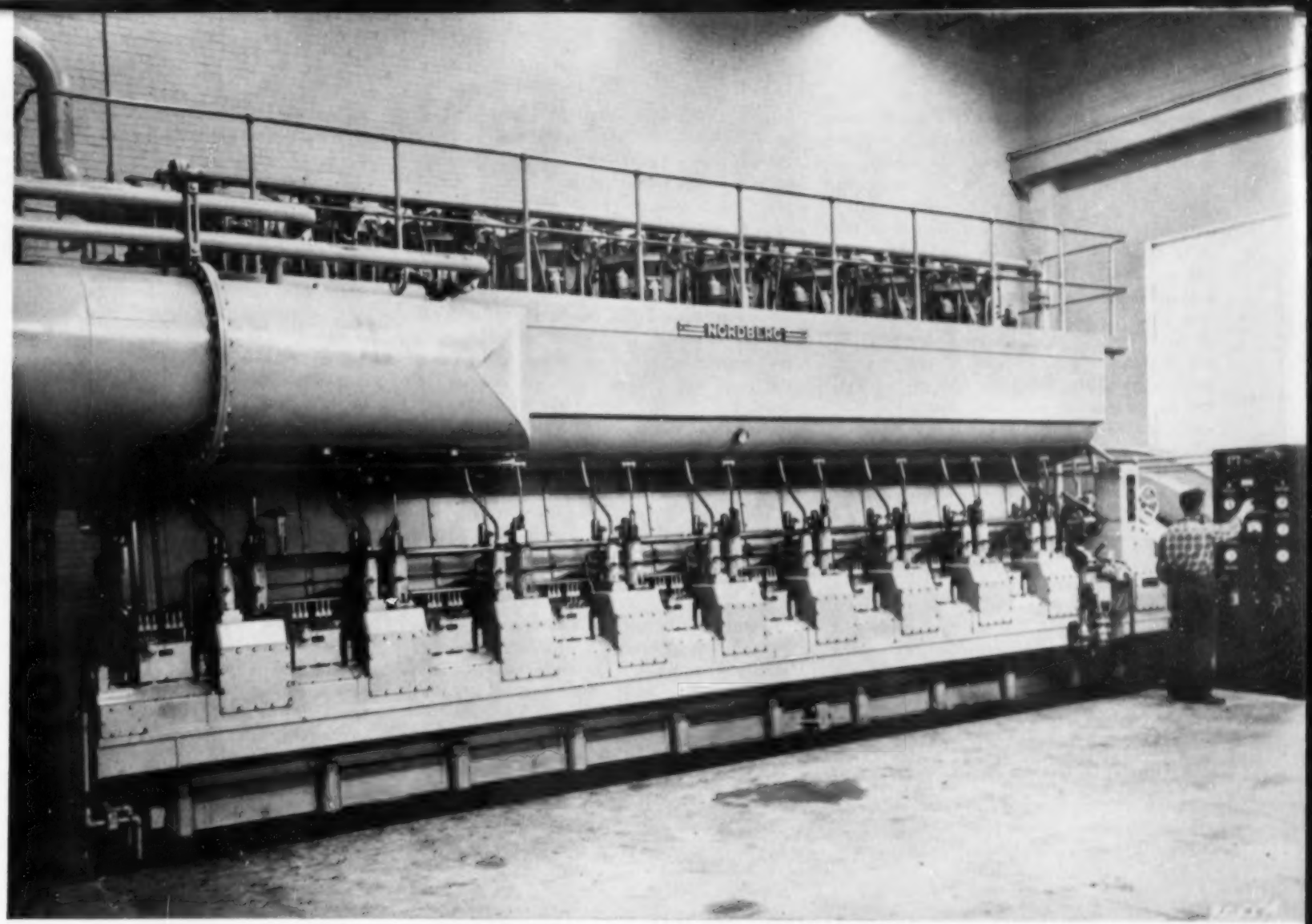
All NRTO-6 engines are equipped with PT fuel systems. This fuel system allows the Turbodiesel to function on all commercially acceptable diesel fuel weights, although No. 2 diesel fuel or furnace oil is recommended for best performance and lowest operating costs. The NRTO-6 Turbodiesel utilizes an open type combustion chamber to obtain its high performance and low fuel consumption. To insure fast removal of exhaust gases and a full charge of fresh air, each cylinder is equipped with dual exhaust and intake valves. Stellite exhaust valve seats and exhaust valve faces are used to minimize corrosive effect of high temperature exhaust gases. Valves and injectors are overhead type actuated by camshaft through a conventional push tube and rocker lever arrangement. Cylinder liners are wet type for rapid dissipation of heat to the cooling water. Liners are honed and lubrited for fast break-in and are replaceable. Pistons are aluminum and are cam ground to insure perfect fit in liner at operating temperatures. A Ni-resist insert is used for the top ring groove. Three compression rings and one oil ring are used, the top compression ring being chrome plated steel. Pistons are balanced, as are connecting rods, so that stock parts can be used when replacing one or more pistons and/or rods without balancing the entire reciprocating mass of the engine itself.

The crankshaft is 4½ in. diameter with induction hardened bearing journals. The crankshaft is forged from high tensile strength alloy steel. Bearings are precision type with copperhead bearing surface and steel back. Lubricating oil is circulated by a gear type pump, which provides positive pressure at all bearing surfaces. A tubular type, jacket water cooled oil cooler maintains viscosity of the oil. A 100 gpm centrifugal type water pump provides circulation of coolant. The NRTO-6 Turbodiesel has been released for marine applications as the NRTO-6-M. Industrial versions of the engine for oil field pumping and cementing as well as for shovels and cranes and similar industrial installations are also available.

The high output of the Cummins NRTO-6 Turbodiesel has been made possible through the development of the Cummins T-590 turbocharger, which is shown below in a cutaway view.



This is the latest addition to the Cummins family of Turbodiesel engines—the 335 hp NRTO-6. A 743 cu in. engine, the NRTO-6 develops 67½ per cent more power than a naturally aspirated version of this same engine.



Firm capacity was restored to the Opelousas plant with the installation of this nine cylinder Nordberg dual fuel engine. Rated 4030 hp at 225 rpm, the engine is direct-connected to a 3575 kva General Electric generator.

OPELOUSAS, LOUISIANA

CONVERSION to dual-fuel operation is writing a new chapter in the history of municipal power at Opelousas, La. Since the first of two Nordberg dual fuel engines was installed at this thriving plant in August, 1950, fuel costs have been cut from an average of 9.05 mills per kwh to 3.21 mills per kwh, a reduction of more than 64 per cent. James H. Prados, Superintendent at the plant, reports that the present cost of delivering power at the switchboard is aprpoximately 6.5 mills per kwh. This includes the costs of natural gas (19.5c per mcf), fuel oil (10.5c per gal), lube oil, maintenance, supplies, salaries, depreciation and interest on indebtedness. When compared to operating costs for 1949, the last full year of straight oil operation, it is seen that the plant now spends 28 per cent less for total operating expenses than it formerly did with fuel oil alone.

This improvement is wholly attributed by Mr. Prados to the two new Nordberg dual fuel engines and to two 1000 hp Busch-Sulzer diesels which were converted to dual fuel in February, 1950. These four engines carry the plant's full load, with the exception of some peaking handled by the original straight oil engines. The first Nordberg was placed on the line on August 17, 1950, and was a 7-cylinder, 21½ in. bore by 29 in. stroke dual fuel unit, rated 2800 hp. The second Nordberg went into service on September 9, 1955 and is a 9-cylinder, 21½ in. bore by 31 in. stroke dual fuel unit, rated 4030 hp. The improvements introduced by these engines tend to prove that a relatively small, efficiently-operated municipal plant can produce dependable power at low cost and at a significant saving to the taxpayer. Since 1950 for example, the Opelousas plant purchased upwards of 2,000,000 kwhs per year from a local public utility in order to meet a rising demand. The average price paid for this power, delivered at the switchboard, is 9.7 mills per kwh. It is expected that the addition of the 4030 hp Nordberg dual fuel engine, in addition to restoring firm capacity at the plant, will make it unnecessary to purchase power during the peak load period of 1956 and will result in proportionately greater savings.

Power and light rates at Opelousas, a town of 12,000 population, compare favorably with rates throughout that section of the country and are the third lowest among municipal power plants in the State of Louisiana. Despite its low rate structure, however, the Opelousas Electric Light and Water Works Department has reported a total net profit of $1,369,466 during the ten year period from 1945 to 1955, every cent of which has been used for the benefit of local taxpayers. Out of these profits $498,594.70 was contributed to the city's General Fund, thereby decreasing property taxes a like amount. In addition, the plant's earnings have been used to pay outright for the construction of a new $100,000 water works and other civic improvements. This certainly is an enviable achievement for a town of 12,000 population.

The history of municipal power at Opelousas goes back to 1898, when a small 120 hp steam engine was installed to supply power for night lighting only. After the turn of the century, when the demand for day service and an increase in the number of connections increased the demand for power, a 100 hp and a 150 hp oil engine were installed. The plant began to prosper and pride in the municipal enterprise was coming into full flower when fire struck and wiped out everything. This was the

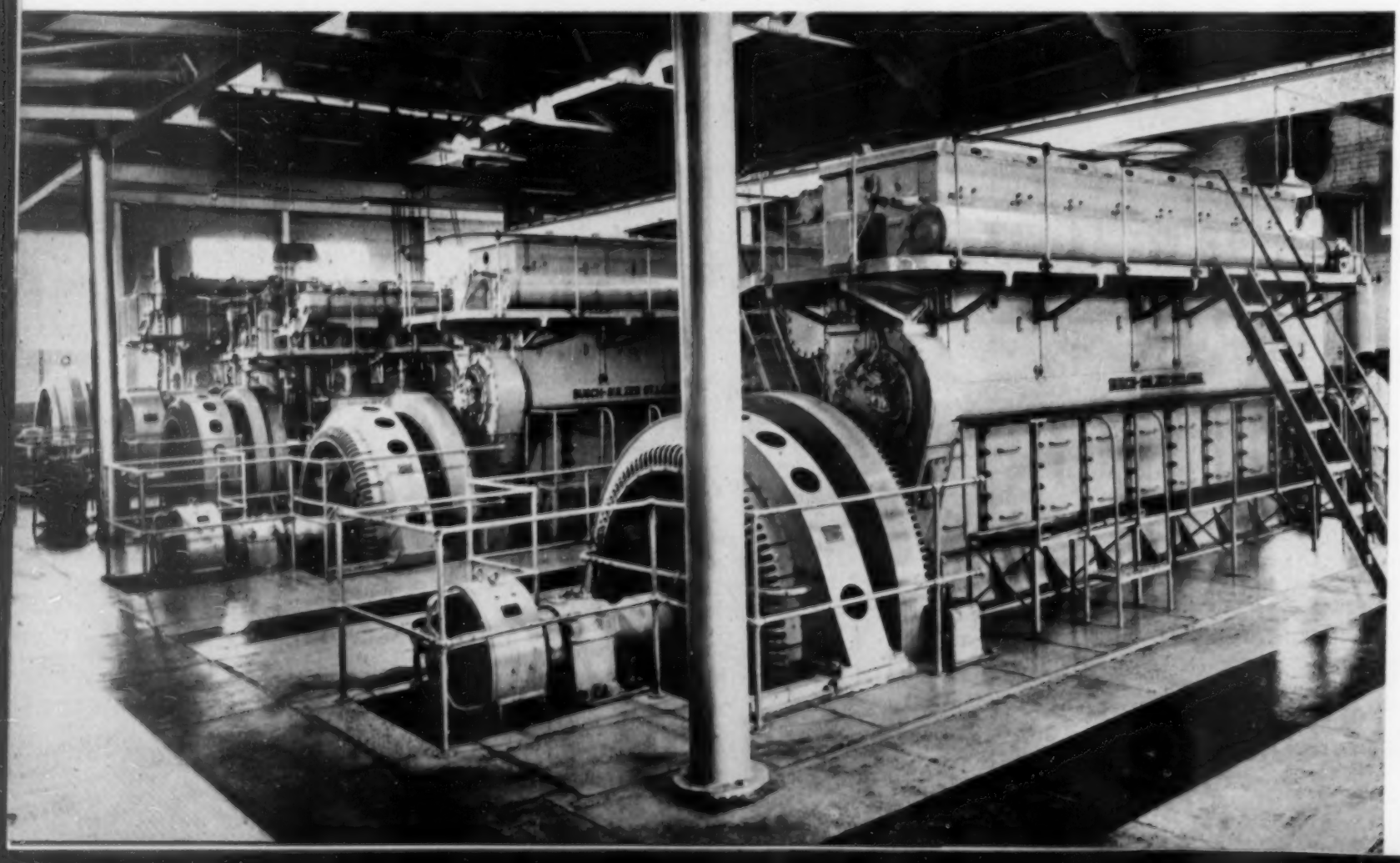
power department's first disaster. The second came in 1918 when mechanical trouble with the engines installed as replacements brought the department to the brink of bankruptcy, with an accumulated debt of $68,500. The town had this choice to make—either to sell what it had and discontinue the plant, or invest new funds in better equipment and start all over again. It is to the credit of Opelousas that the second alternative was chosen and to this day no one has questioned the soundness of that decision. Following a bond issue of $150,000 in 1918, the plant installed the first of seven Busch-Sulzer diesels to be put into service. Two 250 hp air-injection units were installed at that time, followed by a 600 hp unit in 1928, a 960 hp unit in 1931, a 1500 hp unit in 1938 and two 1000 hp units in 1946. Operating costs at the plant generally fluctuated between six and seven mills per kilowatt hour, due partly to the caliber of the equipment and partly to the excellence of the preventive maintenance program instituted under Mr. Prados. Among other precautions, all valves and pistons on the four-cycle engines are pulled for inspection once a year. The 960 hp unit installed in 1931 was paid for in three years out of increased earnings and the high degree of economy of operation enabled the plant to pay cash for the 1500 hp and the two 1000 hp engines.

Studies revealed that it was more economical for local cotton gins to purchase power from the municipal plant than from any other available source. Those gins buying outside power were paying an average of 65 cents a bale for power, while city gins, using electrical power from the municipal plant, were ginning for 31 cents a bale. Other industries currently using power include a potato washing plant, a sweet potato cannery, a meat packing plant, and a moss gin, which processes and bales Spanish moss for use in furniture upholstery. Prior to World War II, the plant had sufficient reserve capacity to sell excess power through a local REA system to neighboring St. Landry Parish, part of Acadia Parish, and to the towns of Krotz Springs, Palmetto, More Water and Rosa. This system placed a load of approximately 200 kw on the plant. With the end of the war, however, demand had increased to such a level within Opelousas that service to the REA had to be discontinued. Peaks began to rise an average of 300 kw per year and by 1951 the plant found it necessary to purchase power during the peak load periods at the end of July, August and early fall. In 1949, the peak load was 2750 kw while the plant's total rated generating capacity was only 3510 kw. In 1950 the addition of the 2800 hp Nordberg dual fuel engine, driving a 1980 kw generator, increased plant capacity to 5390 kw, but peaks jumped to 3380 kw. The older engines, by then 22, 19 and 12 years old, respectively (the original 250 hp units had been moved out in 1946 to make way for the 1000 hp engines), were operating below rated capacity but nevertheless were run at all the load they could carry to meet the rising demand.

Principal reason for the rise in demand is the increased use of air conditioning throughout Opelousas. Mr. Prados reports that virtually every business establishment in town is air conditioned and more and more residences are installing units. The first power was purchased in 1951 and since then each year's purchases have exceeded the previous year's. In 1953, the city purchased a total of 458,688 kwhs in August, September and November. In 1954, a total of 2,385,600 kwhs was purchased from June through December. The utility furnishes all transformers and substations and charges a minimum of $200 per month. Unlimited demand is permitted, up to the 2400 kva capacity of the substation. By 1954, the peak load at the plant had reached 4880 kw, including a peak demand of 1398 kw placed on the utility. To meet these demands, the Electric Light and Water Works Department undertook a well planned expansion and improvement program, designed to cut operating costs in two ways. First, costs would be lowered by reducing the load on the aging Busch-Sulzer units, which after up to 22 years of service were no longer operating at peak efficiency. Second, costs would be reduced further by converting the two 1000 hp Busch-Sulzer units to dual fuel operation and by installing newer Nordberg dual fuel units. These additional units would also provide the extra capacity needed and would restore firm capacity. It was planned that by 1956 the city would no longer have to purchase power in order to meet the power demand.

To house the new units, an addition to the existing plant structure was made, with space provided for a total of three engines. The two Busch-Sulzer engines were converted to dual fuel by the Busch-

The Opelousas plant's original structure was built in 1918 and now includes five Busch-Sulzer engines. The two 1000 hp units in the foreground were converted to dual fuel in February, 1950, while the (left to right) 600 hp, 960 hp and 1500 hp units to the rear are still operated on straight oil.



Sulzer Division of Nordberg in February, 1950, and the first of the two Nordberg engines was placed on the line on August 17th of the same year. The effect of the program's initial phase was felt almost immediately. In 1951, the first full year of dual-fuel operation, the Opelousas plant produced a total of 11,380,000 kwhs, while the three oil engines and three dual-fuel engines consumed a total of 168,137 gals. of fuel oil. In addition, 121,863 mcf of natural gas were consumed. With pilot oil at a current delivered price of 10.5c per gal. and natural gas at 19.5c per mcf, this represents an average fuel cost for the year of 3.61 mills per kwh. In comparison, during 1949, the last full year of straight oil operation, the Opelousas plant produced a total of 10,391,000 kwhs, while consuming 895,451 gal. of fuel at a rate of 11.6 kwhs per gal. At the same delivered price for fuel oil, this represents an average cost for the year of 9.05 mills per kwh. Thus, in the first year of dual-fuel operation, fuel costs were reduced by more than 60 per cent. Following 1951, cost reductions continued as plant personnel became more familiar with gas operation. In 1954, a total of 14,442,000 kwhs were produced, with a gas consumption of 148,811 mcf and a pilot oil consumption of 168,907 gals. This represents an average fuel cost of 3.21 mills per kwh, 64 per cent below the 1949 average. Because these 1954 averages includes some oil generation, particularly during peak load periods, it is expected that operating costs at this progressive plant will continue downward with the second Nordberg dual fuel engine in service full time.

The 2800 hp Nordberg dual fuel engine is direct-connected to a 2475 kva, 1980 kw, 2400 volt, 3-phase, 60 cycle generator, which is V-belted to a 25 kw exciter. The 4030 hp Nordberg dual fuel engine is direct-connected to a 3575 kva, 2860 kw, 4160/2400 volt, 3-phase, 60 cycle generator, which is V-belted to a 40 kw exciter. Gas arrives at the Opelousas plant at approximately 50 lbs pressure, passing through a United Gas Co. regulator, individual meters, individual scrubbers and then to the regulators on the engines. The 2800 hp unit has an attached high pressure gas compressor which injects gas into the combustion chamber at 1150 psi. The new 4030 hp Nordberg, however, admits low pressure gas to the cylinders and no compressor is required for this engine.

Adjacent to the control station of each Nordberg is an unusually well equipped gauge board. For the 2800 hp unit this board contains visual and audible alarms on lube oil pressure and temperature and jacket-water pressure and temperature; a multi-point exhaust pyrometer; push button controls for the jacket-water pump, raw-water pump and air compressor; duplex pressure gauges on raw and soft cooling water, lube oil before and after the cooler, fuel oil before and after the filter; and simplex gauges on starting air, gas 1st stage, gas 2nd stage and gas 3rd stage. The board serving the 4030 hp engine is similar, except, of course, that there is only one pressure gauge for gas. Crankcase vacuum gauges for both engines are mounted directly on the engine frames, near the starting lever.

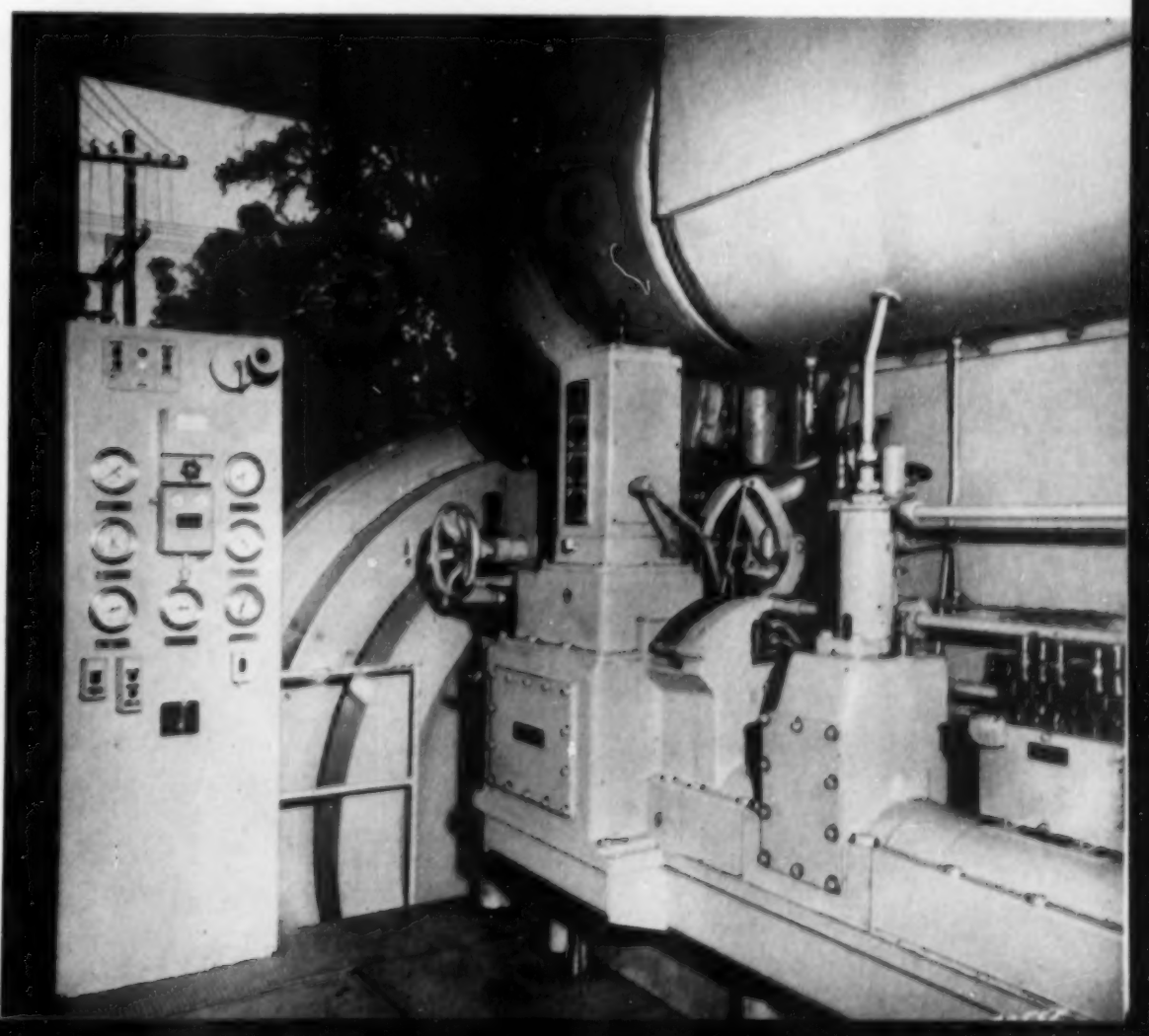
With this equipment the Opelousas Electric Light and Water Works Department is carrying out a well planned program of expansion and improvement of service. Because of his experience with the Busch-Sulzer units, Mr. Prados placed great emphasis on low-speed engines when acquiring the new Nordberg engines. In more than 36 years of experience with seven Busch-Sulzer engines and two Nordberg dual fuel engines, Mr. Prados reports that there has never been an interruption in power service due to engine failure. In addition to those financial dividends already cited, the Opelousas plant has benefited the townspeople by building a $15,000 city hall entirely out of plant profits. It has paid for the extension of water mains and street lights to every section of the city; it has covered the cost of installing traffic lights at key intersections. Over and above this, the plant distributes power free of charge for street lighting, for Christmas decorations, and for water supply. This last item places a load of about 170,000 kwhs per month on the plant. Also, power is supplied at cost for all churches, schools and municipal buildings, as well as for softball, football, tennis, swimming pools, and other recreational facilities.

The proud little city of Opelousas has a long and colorful history. It is the third oldest city in the state and at two separate times it was the capital. Opelousas is the site of the Louisiana Yambilee, held each October and its daily newspaper, The Daily World, was one of the first daily papers in the United States to be printed by offset. The operating record of its municipal power plant since the conversion to dual fuel and since the new engines were placed on the line indicates that the city can look forward to even greater financial dividends and community progress in the future.

List of Equipment

Engines and generators—1—Nordberg 7-cylinder, 21½ in. bore x 29 in. stroke, two cycle, dual fuel engine, rated 2800 hp at 225 rpm. Direct-connected to a 2475 kva, 1980 kw, 2400 volt, 3-phase, 60 cycle General Electric generator with 25 kw, 200 amp, 125 volt direct current exciter. 2—Nordberg 9-cylinder, 21½ in. bore x 31 in. stroke, two-cycle, dual fuel engine, rated 4030 hp at 225 rpm. Direct-connected to a 3575 kva, 2860 kw, 4160/2400 volt, 3-phase, 60 cycle General Electric generator with V-belted 40 kw, 320 amp, 125 volt direct current exciter.
Governors—Woodward.
Fuel oil transfer pumps—Roper and Blackmer.
Fuel oil centrifuge—DeLaval.
Fuel oil filters—Nugent.
Fuel oil injection pumps—American Bosch.
Lube oil—Shell.
Lube oil purifiers—Honan Crane.
Lube oil duplex filters—Nugent.
Cylinder lubricators—Manzel.
Before-and-after lube pumps—Blackmer.
Lube oil coolers—Ross.
Jacket water coolers—Ross.
Jacket water circulating pumps—Allis-Chalmers.
Raw water circulating pumps—Allis-Chalmers.
Cooling tower—Pritchard.
Scavenging air blower—American Blower.
Air compressors—Gardner-Denver.
Automatic thermostatic valve—Fulton-Sylphon.
Alarms—Viking.
Exhaust pyrometers—Alnor.

The control station on the Opelousas plant's 2800 hp Nordberg dual fuel engine. Shown are the Woodward governor, American-Bosch fuel oil injection pumps, Manzel cylinder lubricators. The Nordberg gauge board contains Viking visual and audible alarms and Alnor exhaust pyrometer.

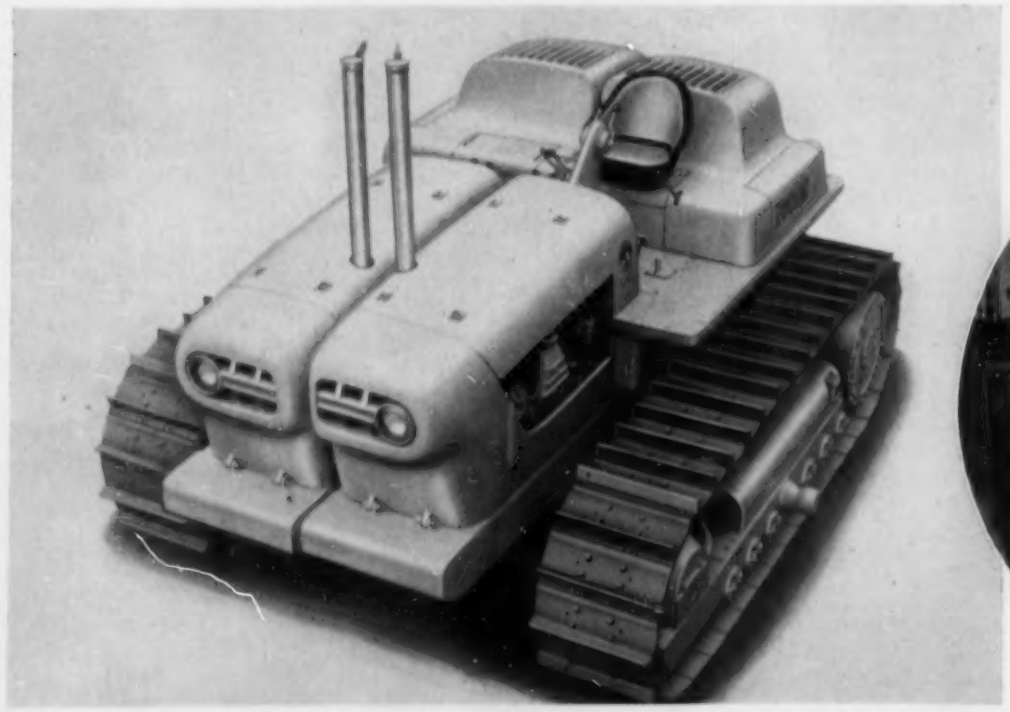


A twin-engined Euclid TC-12 adds a push to a TS-18 scraper. These two units working together probably represent the most powerful earthmoving combination.

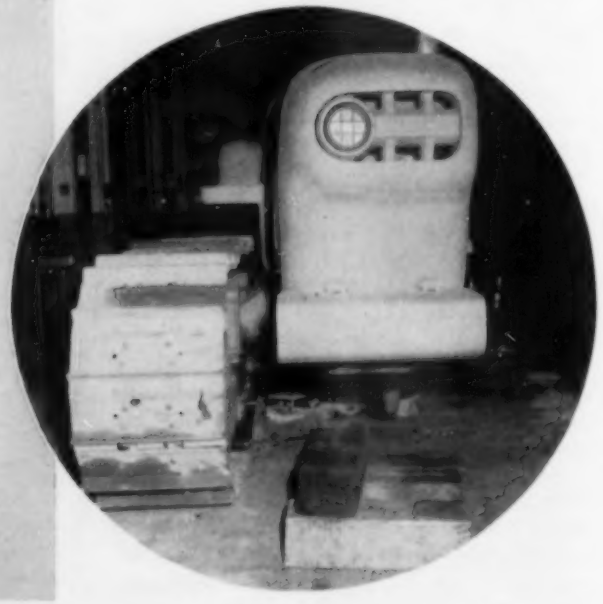
EUCLID ROUNDUP

EUCLID'S big 388 hp, twin-power TC-12 crawler tractor and its smaller 194 hp C-6 largely owe their rapid development in approximately 20 months' time to the experience the firm has had in building torque converter driven units. The torque converter and semi-automatic transmission is used in both. The C-6 crawler is, in effect, a half-section of its big brother, the TC-12. Power is derived from two Model 6-71 Detroit diesel engines in the case of the TC-12 and one engine in the C-6. The drive is through an Allison torque converter and a Torqmatic transmission.

Said to be the first scrapers to be completely hydraulically controlled, Euclid's line of two-axle overhung engine scrapers have struck capacities of seven, twelve and eighteen yards. The 18-yard model is also produced in a twin engine model. The twin engined, 18-yard model, the TS-18, has been at work on the Indiana Turnpike as well as many other earthmoving jobs.



The TC-12 which is powered by two Detroit diesel engines Model 6-71. This twin unit can be virtually cut in half for transportation over the highway where the normal width exceeds legal dimension.



The strength, speed, stamina and flexibility of dieselized off-the-highway hauling units have played a large role in cutting the cost of moving earth, rock, coal and ore of all kinds. The development of such units has revolutionized open pit mining and the construction of roads, dams and airports. Euclid has played a leading role in this field. On the Mesabi Iron Range, where the first Euclid rear-dumps went into service in 1937, the flexible use of trucks in place of rail haulage was responsible for greatly speeding up mining operations. Production has risen more than 50% in terms of tons per man hour handled.

These gigantic hauling units, ranging from 15 to 50 ton models, are seeing duty in almost every corner of the earth. The application of torque converters has made possible the larger 34 and 50-ton jobs and generally contributed to over-all efficiency wherever applied.

Earthmoving equipment plays a little heralded role in the economy. Yet, the tremendous savings on the almost impossible jobs being performed by such equipment has made possible the great expansion of our economy in recent years. The construction industry, the earthmoving industry, the road-building industry and the mining industry have all felt the impact of this dieselized equipment and grown under its great force.

The S-7 Euclid scraper with a 7-yard capacity. It is one of the series that also include 12 and 18 yard capacity scrapers. A TS-18 model boasts of twin engines.

Dieselized equipment on the job for Isbell Construction Company. Here a Euclid truck is being loaded by a Bucyrus-Erie shovel. One of the pioneers of the twin-engine idea in earth-hauling equipment, Euclid built one of the first off-highway trucks of this type about ten years ago. It was a 54-ton rear-dump unit.

DIESELS HELP MAKE STEEL

Fairless Works Utilizes 18 Diesel-Electric Switchers on 80 Miles of In-Plant Track

DIESEL locomotives are playing a vital role in the operation of United States Steel's Fairless Works, the new steel plant at Morrisville, Pa. The plant occupies a tract of 3900 acres with the two blast furnaces, nine open hearth furnaces, the 2-battery coke works, the slabbing mill, hot strip mill, blooming mill, billet mills, bar mill and sheet and tin division spaced to permit future expansion. This spacing of facilities, which will make possible efficient development far beyond current design production of 1,800,000 ingot tons per year, increases the problems and the importance of efficient materials handling. For example, it is more than a mile from the blast furnaces to the open hearth furnaces and 0.9 mile from open hearth to stripper.

To handle a wide variety of material movements, U. S. Steel has developed an in-plant rail system which includes 80 miles of track, 250 standard gauge cars and hundreds more of special rolling stock designed specifically for steel plant service, and finally, at the heart of the system, 18 diesel-electric locomotives. All the diesels are 1200-hp., 120-ton units, eight of them Fairbanks-Morse 2-cycle opposed-piston diesel locomotives.

Both the Pennsylvania and the Reading railroads have lines serving the new plant and can deliver cars to any of four yards in the Fairless system. The RA and RB yards have a capacity of 520 cars and are devoted to holding and classification of materials for the open hearth area, for maintenance materials and for miscellaneous freight. The RC yard can hold 600 cars of coal, iron ore, limestone and dolomite for the blast furnaces and coke works. The East Yard, with capacity of 100 cars, handles materials for the rolling mill and the sheet and tin division and serves as a pickup point for outbound shipments. A separate yard serves the National Tube Division, handling incoming materials and outbound shipments of sheet and tube. In addition, there are four internal storage yards with capacity of 450 cars.

As many as 700 cars will be moved into the Fairless yards in a single day and the first jobs for the U. S. Steel's locomotives are classification and delivery to unloading locations. Sometimes this means swift, precise handling of single cars, sometimes the movement of 90 or 100 cars of coal or iron ore in a single haul. There is always one unit assigned to move cars from RC yard to the car dumper. The locomotive moves groups of about 10 cars over a hump from which they move by gravity to the big dumper which turns each car bottom-up and dumps contents in a single operation. The dumper can handle 30 cars an hour. Hot metal is moved from the blast furnaces to the open hearth furnace in thermos ladles big enough to hold 200 tons. The ladle itself weighs another 200 tons. Although the diesel has to move the load 5600 ft., the combination of thermos insulation and the large mass of molten metal makes possible easy transfer without any solidification of the metal. In each 24-hour period, 1500 tons of metal come from the blast furnaces. Though the large ladles reduce the urgency of rapid transfer, diesel dependability still is essential, because a breakdown while moving the hot metal could be costly.

The largest number of diesels is assigned to the open hearth area where some of the roughest service conditions prevail. For the most part, specially-equipped Fairbanks-Morse units are used in this work. First job is to move cars of scrap from the yard to scrap storage where it is unloaded by cranes. As needed, scrap is loaded into charging boxes on buggies and a line of as many as 40 buggies weighing a total of 2000 tons is moved up a 2¾% grade to the open hearth charging floor by a single diesel. Limestone and ore also are handled in charging boxes in the same manner. Every 10 hours, each of the 9 open hearth furnaces yields 300 tons of steel. When the furnace is tapped, the metal flows into a ladle and is then poured into molds which stand on special mold buggies. From 8 to 22 tons of metal go into each mold and there are 2 to 4 molds on each buggy. The molds, incidentally, weigh about as much as the metal they hold. One heat of 300 tons fills enough molds to load 8 or 9 buggies. The string of buggies is then moved by a diesel locomotive nine-tenths of a mile to the stripper. On this trip, the metal solidifies so that the molds can be stripped from the steel ingots on arrival at the stripper.

The next movement again places a premium on diesel dependability. The ingots go from the stripper to the soaking pit where they are heated to an even temperature to permit rolling. Naturally, the longer the steel is permitted to cool, the more it needs to be heated before rolling. It is estimated that every excess minute between stripper and soaking pit doubles the time the ingot must stay in the soaking pit. This is but a bare outline of locomotive activities at Fairless, for there are innumerable additional jobs for the diesels. For example, empty ingot molds must be sprayed and cooled and prepared for reuse. Molds of different sizes must be picked up and delivered to the furnaces. Fire brick and refractory materials are moved to the open hearth floor. Wherever a full car is delivered, an empty car must be returned. There are 17 air dump cars to handle debris, flue dust from the blast furnaces and dust from the open hearth precipitators. The locomotives not only propel the cars but provide compressed air for dumping. Upon occasion, the diesels have served as mobile, standby generating plants for crane operation.

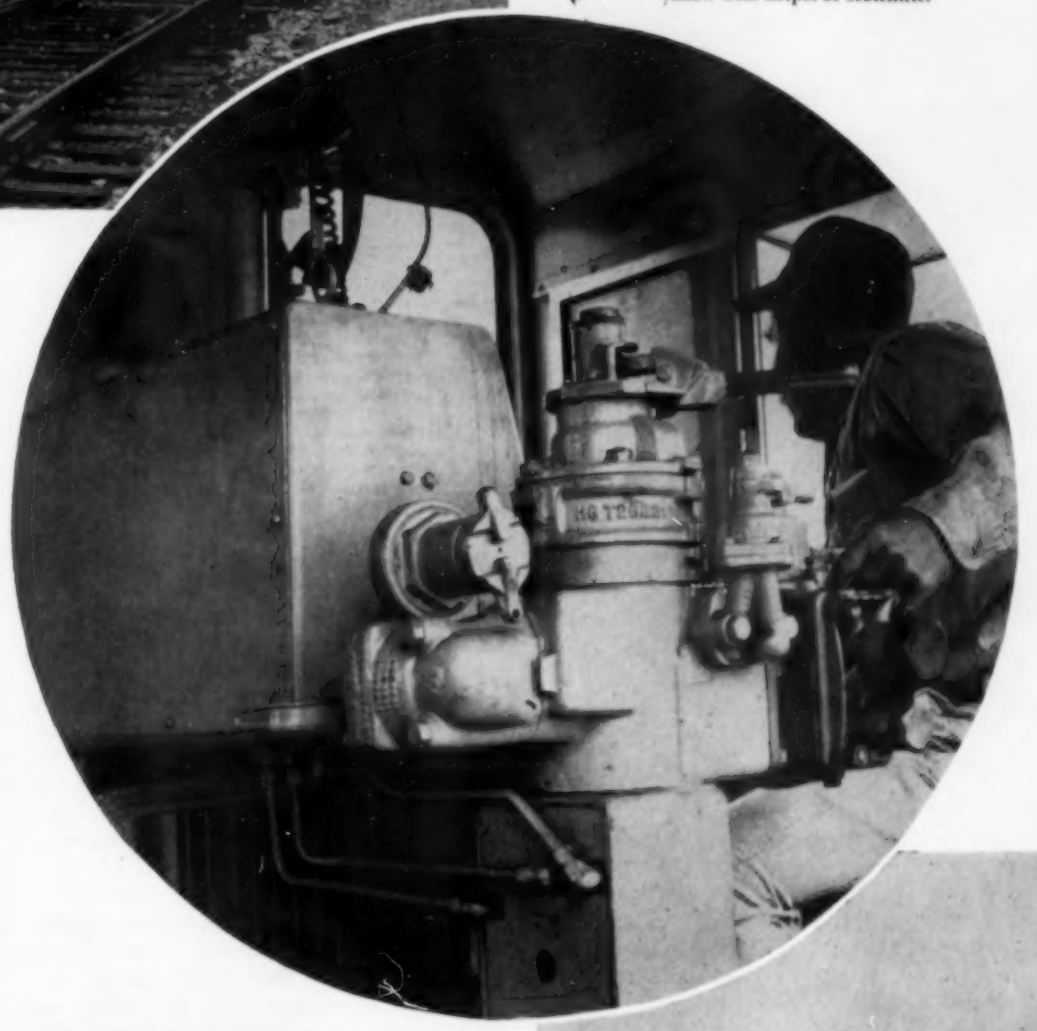
One job which may be greatly enlarged is the handling of iron ore. Ore comes in by ship to the Fairless Works docks and for the most part is moved by conveyor to storage and then to the furnaces. Sometimes, however, ore is dropped into hopper cars and moved by the diesels directly to the open hearth shop. Finally, the diesels deliver carloads of finished products to the yards for pickup by the railroads. This volume is expected to average about 100 cars a day.

It is evident that operating conditions for a diesel locomotive at Fairless are demanding. The locomotives must be rugged, versatile and equipped for the special requirements of the job. In classification of freight, humping cars at the car dumper and positioning of cars at the open hearth furnaces, stripper and soaking pit, precise control is essential. The company's transportation officials report that the F-M switchers are easy to start and can be moved as little as two inches if necessary. This is accomplished through use of the low power control which reduces excitation of the main engine generator and cuts power to the traction motors to as little as 8 hp.

246,000 lbs. fully loaded with all weight on the four driving axles. With a gear ratio of 68:14, the unit has a maximum speed of 60 mph. and develops a maximum continuous tractive effort of 34,000 lbs. at 11.3 mph. The locomotive is powered by a 6-cylinder, 2-cycle, Fairbanks-Morse opposed-piston diesel rated at 1200 hp. at 850 rpm. The diesel turns an 830 kw. Fairbanks-Morse generator which supplies current to the 4 F-M traction motors.

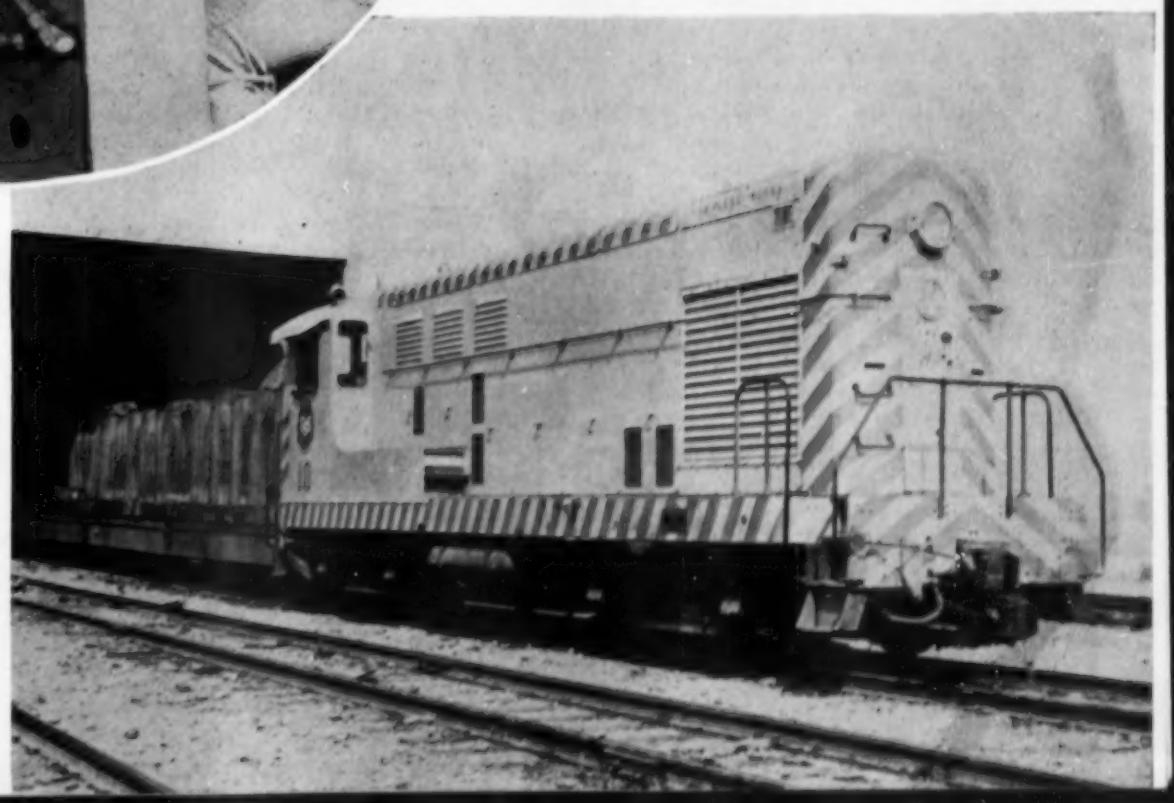
Particularly in the open hearth area, locomotives are called on to move standard cars with standard couplers and special ingot and charging box buggies with low couplers. All the F-M switching engines are equipped so they may be coupled swiftly to either type of car. The diesels regularly move some extremely hot commodities with temperatures running up to 3000°F. With the locomotive coupled directly to cars carrying this hot metal, ordinary glass would not stand the heat and the Fairbanks-Morse units are equipped with Herculite heat resistant glass. This also affords protection to operating personnel. Visibility is important in any switcher and particularly so in steel plant service. Virtually the entire back of the F-M hood-type locomotive is glass, affording the operator excellent vision to the rear, to both sides and forward. An unusual feature devised by U. S. Steel engineers is a large mirror set at the left side of the cab which permits the man at the controls to look forward on the left side of the locomotive in addition to his direct view forward on the right side. Just as it is easy for crew members to see from U. S. Steel's locomotives, it is easy for others to see the switchers. This, of course, is an important safety measure in this busy plant with its heavy, varied traffic. All the engines are being painted with a high visibility yellow and striped with Scotchlite which has high reflective qualities day and night. In addition, a yellow blinker has been installed on top of each locomotive.

One of the Fairbanks-Morse switchers at the Fairless Works hauls cars of scrap to the scrap storage yard. The double couplers permit the locomotive to be coupled easily to either standard cars or the special low buggies that carry charging boxes and ingots. New paint job features high visibility yellow with stripes of Scotchlite.



Steel making is a 24-hour operation, 7 days a week, 52 weeks a year, and U. S. Steel expects virtually continuous service from its diesels. The locomotives are scheduled for work 24 hours a day and are withdrawn for regular preventive maintenance for one 7-hour turn only once a week. The company has a well-equipped diesel maintenance shop and usually can accomplish any necessary job in the 7-hour period.

With molds removed, hot steel ingots are moved to the soaking pits by the F-M diesel. Each ingot weighs from 8 to 22 tons. No delays are permissible on this run because every excess minute of cooling doubles treatment time in the soaking pits. The diesels at Fairless operate 161 out of 168 hours per week, 95.8 percent of the time.



Operator at the controls on one Fairbanks-Morse H12-44 diesel-electric locomotive which is powered by a 1200 hp. F-M opposed piston diesel. One feature of the controls is a low power circuit which permits easy starting and precise movements. Note Westinghouse radio-telephone which links every switcher at Fairless to the yard office and six substations.

The same engine that does classification in the yards may be called upon to move very heavy loads. A steel plant deals in heavy materials, and a single loaded car may weigh 400 tons. Loads of 2000 tons have to be pushed up a 2¼% grade at the open hearth furnaces. This necessitates the use of heavy-duty equipment. The Fairbanks-Morse H12-44 locomotive used at Fairless weighs

Bulldozer with teeth! Allis-Chalmers HD-21 reaching out over bank edge to pull back soil that would be rolled into path of traffic by ordinary bulldozer. One of J. A. Thompson & Son's fleet of 8 HD-21s, 8 TS-200s and 20 HD-20s. All are operating around the Los Angeles area at dirt moving in the many new developments for homes, villages, industry and freeways.

Allis-Chalmers Model WD-45 with 2-bottom spinner plow preparing cotton seedbed near Chandler, Arizona. Gail Johnson, owner, also owns another WD-45 tractor and an Allis-Chalmers All-Crop combined harvester. Johnson is farming about 550 acres of barley, cotton, corn, alfalfa, higara, etc. in a fine 2-crop area of the copper state.

DIESELS GIVE A BIG LIFT TO SOUTHWEST

By F. HAL HIGGINS

A Stolte heavy construction engineer on the new freeway being built in Contra Costa County advised the writer to keep his eye on the new Allis-Chalmers Buda diesels in construction equipment as he gave two freeway sections a going over awhile back to see what the big dirt moving contractors are buying to cut their costs and speed up their wet winter delays. As the writer had followed the Allis-Chalmers crawlers through the past 28 years of development from their start with the Atlas diesel engines in the old Monarch tractor chassis, up through Hesselmans, Allis-Chalmers improvements on the Swedish engine, GM diesels, and finally their acquiring of the Buda Company only two or three years ago, he immediately decided it was time for a look at the new models of Allis-Chalmers tractors, graders, scrapers, etc., with the Buda power as now built, sold and serviced under Allis-Chalmers colors.

"Go out and see some of our local dealers Shaw's contractor customers who are clearing and shaping lands for the increasing population," advised Ray Fletcher of the Allis-Chalmers branch in Los Angeles as he answered questions about the new models brought out for farmer, contractor, logger, pipe line builder and government this year. "Take Thompson & Son Co., who are now clearing off two rolling orange groves near Whittier. You will find their fleet of Allis-Chalmers tractors, scrapers and other equipment out near Whittier with more of it in other areas around Los Angeles."

"The Allis-Chalmers traction booster along with our engines is giving our line a real boost in the farm power field," said Fletcher. "You can recall, of course, when the first American diesel tractor appeared at the California State Fair at Sacramento in 1928. That was distinctly a first in this field, even though the diesel engine was a comparatively slow speed Atlas. Then there were such other developments as the All-Crop combine that caused a revolution in the soil building seed crops by cutting costs sharply and insuring high quality seed by getting such crops harvested when they should be harvested. The introduction of the torque converter to the big crawler diesels was also an Allis-Chalmers development. Big and little tractors, crawlers and wheels, over the years our engineers back at Milwaukee, Springfield, and other mid-western areas as well as here at Oxnard, Calif., have not only kept abreast of the latest engineering and metallurgical advances but have anticipated the demands of the portable power consumer for more efficient tools to cut costs and increase production per operator in line with mass production trends of farmer, logger, dirt mover, pipe line builder and governmental bodies."

"Take this new traction booster system. In simple terms it means more work, done better, at lower cost and in less time. This system is as fully automatic as the tractor's governor. Take disking and the traction booster automatically shifts the implements weight to the tractor's drive wheels, as needed, for ground gripping traction. Instead of dragging weight, the operator has rolling weight, requiring less fuel. It is going big in Arizona as well as in California and the Midwest."

The writer took a day to run out and have a look at the big development job of the J. A. Thompson & Son Co. near Whittier. Here he saw a fleet of Allis-Chalmers TS 200 motor scrapers picking up loads of earth from the high spots in an orange grove that had been cleared off. They spread their loads in the low spots as they leveled the acreage for streets and homes. The scrapers worked like teams of trained acrobats as they darted from one

end of the denuded orchard to the other. The Thompson superintendent on the job observed that these scrapers were the spark plugs of the job. The engines are 176 hp, and the scraper features all-hydraulic control, forced positive ejection of material handled and speeds up to 21.6 mph. The scraper has dual hydraulic pump and protected oil lines to keep oil and pressure constant regardless of angle of tractor turn. These Allis-Chalmers motor scrapers, by the way, have a long rugged development through the old Laplant Choate Company at Cedar Rapids, Iowa. It was the firm that started manufacturing the bulldozer after Fred Lewis had built one to sell a Best tractor way back in the early 1920's. From then on the bulldozer idea for tractors spread rapidly and was picked up and developed by all concerns in the big crawler tractor industry. Eventually, today we see dozers even on garden tractors for clearing snow off city sidewalks.

Allis-Chalmers HD-21 on a land leveling job in Kern County, Calif. owned by Max Reed, Sacramento. This land will be irrigated for potatoes, cotton, alfalfa and corn.

One of the new Allis-Chalmers HD-11G crawlers with tractor shovel loading manganese ore at the Needle Eye Mine just north of Bill William River, Arizona. Dealer Neil B. McGinnis of Phoenix sold and services tractor, which is owned by Evans & Evans, Aguila, Ariz. The firm also has an HD-5G of same make on their farm. This tractor uses only 60 gallons of fuel in a 20-hour day of operation. Tractor does dozer work, sorts ore after blasting, and loads trucks for mine mill.

A brief look at the Buda diesels in these motor graders and tractors, all under the Allis-Chalmers banner today, reveals these facts for power buyers: Fast all-weather starting from a 24-volt electric starter. A primer system injects low flash-point fluid for instant starting even in below freezing temperature. All valves are shaped for fast heat dissipation with specially hardened removable seat inserts for exhaust valves. Extra high cylinder head provides larger water jacket for extra cooling capacity. Connecting rods are rifle-drilled full length for positive piston pin lubrication. Low cost overhauling is assured by replaceable wet type cylinder liners that give even cylinder cooling and long life. The crankshaft has 12 integral counterweights to provide smooth engine performance at all speeds. The engine in the TS 200 motor scraper has high-torque at all speeds. Engine is Model 6-DA-779 of 176 hp. It is 6-cylinder, 4-cycle with 540 ft. lbs. torque at 1400 rpm. Total displacement is 779 cu. in. with bore and stroke of 5¼ in. x 6 in.

Ed Corley's Allis-Chalmers HD-16 pulling a 3-bottom reversible Atlas plow turning up hard ground to a depth of 18 inches near Casa Grande, Arizona. It is breaking up old milo maize land 18 inches deep near Stanfield, Arizona. Corley also owns an Allis-Chalmers HD-7. Corley is testing out this deep plowing seen here against deep subsoiling, both being heavy duty jobs for his diesel tractor. Corley and partner, Newton Cooper, farm 2,000 acres of irrigated land here.

AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

New Ways to Crank a Diesel

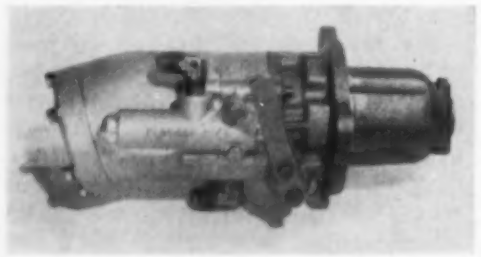
OWING to their high compression, diesels have always required external power for starting. Originally, compressed air was used, being introduced above the pistons. Early tractor diesels were started in the same manner as their gasoline predecessors, namely by small gasoline engines. Motorcycle engines were popular for this purpose, though today built-in starter engines are largely used. Electric starting, however, is still the prevalent system for automotive diesels and is used almost universally for electric generating plants and sets. It was, of course, the natural solution for automotive applications because of its high state of development for gasoline power plants.

However, the higher compression of the diesel imposes the requirement of much higher starting torque than a gasoline engine of similar displacement. For this reason the 6-volt and 12-volt systems which were satisfactory for the latter were found entirely inadequate for diesels. Some use of 12-volt starters persists on smaller sizes; but the 24-volt machines predominate. This, of course, is because, with the higher voltage, sufficient spinning power can be produced in motor frames of the same size as the lower-powered 12-volt motors. Except in military applications, however, full 24-volt systems are not used. With the high degree of standardization of 12-volt generators, lights, horns, switches and other accessories, it is highly advantageous to retain 12 volts for all electrical functions with the exception of starting. Thus, in modern systems, the generator and all other portions of the electrical system operate at 12 volts, a series-parallel switch, operated in conjunction with the starter relay, providing 24 volts to the starter only. This, of course, requires that the battery be in two sections of six cells each, to be connected in series for starting and in parallel for all other functions. Ordinarily, in automotive practice, four 6-volt batteries are used, for the sake of handling ease.

About 20 years ago an alternative system which it was hoped would eliminate the series-parallel switch and the 12-cell battery required by such starting systems, was developed. This was the inertia starter, which was originally created for starting airplane engines. As applied to diesels, it was provided with a 6-volt electric motor to wind up the inertia members. More recently they have been improved and inertia starters are still used for light planes and as emergency starting means for larger ones. They are also used for starting diesels where starting is infrequent and where electric power or compressed air are not readily available, and present types are hand-powered only, and are more efficient than earlier electric driven inertia starter models.

An early solution of the starting problem was the dual-cycle system, in which the diesel was converted temporarily into a gasoline engine for the purpose of starting. This scheme is still used in small diesels and in industrial diesels; though not in automotive service. The result is accomplished by providing an auxiliary air chamber, which can be opened to the combustion chamber to reduce the compression ratio, a carburetor and an ignition system. By these means the engine is started on the Otto cycle, using gasoline as the fuel and then switched over to the diesel cycle by closing off the communicating valve to the auxiliary air chamber, supplying diesel fuel to the injection pump and cutting off the carburetor and ignition system. With the lowered compression pressure to be overcome in starting, this system made ordinary gasoline-engine starters of 12 or even 6 volts adequate.

Recently, for the purpose of both weight and cost reduction, a return to the compressed air system has been made. Here, the air in the brake system, common to most dieselized trucks and buses, is used to turn a compact air motor, interchangeable with the electric starter, driving through the conventional flywheel gear. For safety, an extra air reservoir is usually provided, equipped with a check valve to prevent the starter depleting the system of pressure and at the same time providing a reserve for the starter. By means of a glad-hand connection it is possible for a vehicle which may have exhausted all of its air in attempts to start to replenish it from the shop or garage air supply or from another vehicle. This operation consumes less time than the exchange of or boost to a battery. Normally, the air starting system provides capacity for from ten to twelve starts without lowering the reservoir pressure below the safe minimum for the brakes. It is controlled by a simple valve.



Pictured above is the hydraulic starting motor of the Aeroproducts Hydrostarter. This motor is the heart of the hydraulic starting system, which is very compact and light in weight.

Latest development is the hydraulic starter, which is entirely independent of either the electrical or air systems of the vehicle. Here, a compact hydraulic motor, interchangeable with the electric starter, is used, supplied with oil under high pressure from a piston-type accumulator, utilizing an inert gas as the elastic medium. The accumulator is supplied with oil under pressure by an engine-driven pump, drawing it from a reservoir to which the engine outlet fluid returns. There is also a hand-operated pump which can be used in an emergency to restore pressure to the system and for slow motoring of the engine for purposes of adjustment and timing. Extreme compactness and light weight of this system are possible because of the working pressure of 3,000 lbs per sq. in. which is used. The accumulator, though of moderate size, is thus able to provide for repeated spinning of the engine for starting.

LOCOMOTIVE COOLING SYSTEM REGULATOR

A new temperature control that solved cooling problems is the blessing of diesel locomotive crews in Ford Motor Company's Rouge plant, Dearborn, Michigan. Over the 106 miles of railroad track interconnecting the various manufacturing units of the 1200-acre plant area, sixteen diesel locomotives maintain a precise schedule of movements during the 24-hour-a-day operation. Varying between full load and no load, the locomotives' intermittent operation gave rise to problems of temperature control that demanded a unique solution. Due to the daily on-and-off use given these engines—which are employed for switching purposes—the diesel engine temperatures varied from below 100°F. during idling conditions to approximately the desired 160°F. during full load conditions. This varying temperature decreased the efficiency of the engine and increased maintenance costs. In addition, during the winter months there wasn't sufficient heat in the cabs to keep the operating crews comfortable. The problem was finally solved with the installation of temperature regulators of a three-way type specially developed by Fulton Sylphon Division of Robertshaw-Fulton Controls Company, for use in internal combustion engines and other temperature control applications. The new regulators, model numbers 1280 and 1281, contain an unusual power-pill unit, which is charged with a solid, wax-like compound, instead of employing the conventional liquid or gas-filled thermal element.

View showing location of control valve in relation to diesel engine, which is to right. Valve is within easy reach of operators when side panel of locomotive is opened.

Close-up view of control valve looking upward from the outside of locomotive.

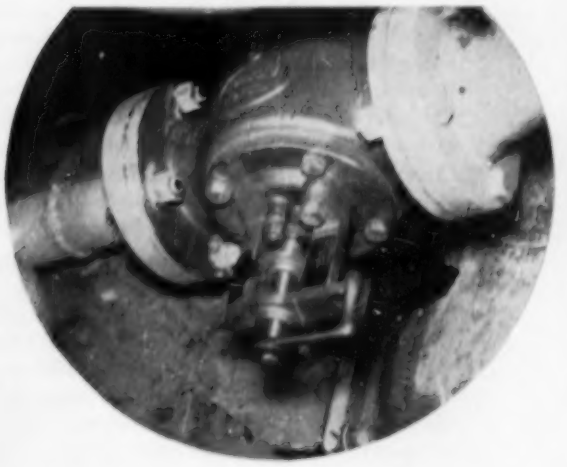
When subjected to heat the special wax-like compound imprisoned in the power-pill unit melts and expands, generating an extremely powerful force. The heated liquid contracts upon cooling and returns to a solid state. The three inch, No. 1280 temperature regulator was installed on the water outlet from the diesel engine and was piped so that it operated as a diverting valve. As the cooling water temperature rises, more of the water was directed to the cooler as required to maintain constant engine temperature. Since its installation, the locomotive shutters are constantly kept closed below water temperature of 160°F. with the No. 1280 the main control below the 160° temperature.

A feature of the model 1280 (but not the 1281) is the hand crank. It constitutes the only difference between the two models. The hand crank, used to over-ride automatic action or for emergency manual control, has two advantages in this particular case. First of all, since these locomotives do not use antifreeze, the cooler port is preset by means of this adjusting crank. So adjusted, it will never completely close and will always furnish sufficient hot water to the coolers to prevent freezing and subsequent damage. Another advantage of the adjustment crank is that it allows the engineer to control the engine temperature manually beyond the actual temperature range of the power-pill unit or in emergencies. In addition, the crank is designed as a self-locking device, thereby securing any setting. The regulators contain from one to four power-pill units, depending upon the size of the valves which range from 2 in. to 6 in. A variety of temperature settings are available, ranging from 120°F. to 190°F. These settings may be altered by changing power-pill units.

The manufacturer also reports increased sensitivity in the new valve as compared with older types. Since the installation, Ford Motor has found the valves are now maintaining constant engine temperatures under their varying load conditions. The crews are a good deal more comfortable since the cab heaters are now being supplied with higher water temperatures for heating.

Diesel locomotive in front of EE Building, Rouge Plant, Ford Motor Company.

Direct view of Fulton-Sylphon valve installation showing flange connection.



EASTERN DIESEL OBSERVATIONS

A COMMENTARY BY **ARNOLD B. NEWELL**

Arnold B. Newell, a third generation American, was born near Seattle, Washington of pioneer stock. He obtained his engineer's license at 21. Sailed as chief engineer on one of the first ocean-going motorships built in the U.S.A. In 1924 he joined New York Shipbuilding Company in diesel advisory capacity, tested and took to sea New York-Werkspoor diesels, supervised operation of shipyard owned vessels, then in 1927 joined Ingersoll-Rand as diesel field engineer. Became associated with "Motorship" in 1929. Subsequently became managing editor of "Motorship" and "Diesel Power," then vice-president and general manager.

BIG Orders: An indication of the health of the diesel industry is the frequent placing of extra big orders for diesels and equipment driven by American made diesel engines. One such instance is the ordering of 160 new diesel electric locomotives by the N.Y., N.H. & H.R.R., some 60 of which will be combination units taking power alternately from their own diesels and then from the third rail when they enter the New York Central System electrified areas.

Of far greater dramatic interest is the Southern Peru Copper & Smelting project to cost $200 million and eventually to need some 400 diesels for various classes of service. It is expected that mining and smelting will start in 1957, but before that can happen they must top strip to the tune of 190 million tons of earth at an elevation of 11,000 ft. Supercharged diesels will work well at this altitude. The low rate of fuel consumption will reduce the cost of transporting it to the mines. One company—to be more specific, Cummins—will deliver 235 diesels to this project and a little later supplementary orders for another 50 can be expected. American capital is paying for this huge project and Peru has ample dollar exchange. At the same time these available dollars are presumed to buy more in other parts of the world than they will in America. However, it is apparent that the quality of our engines and other machinery cannot be equalled elsewhere and if there is a price premium on this quality the feeling is that it's worth it.

The 17,000th G-M Locomotive: The Electro-Motive Division of the General Motors Corp. has just celebrated its 20th year in business during which time it has produced 17,000 diesel locomotives. Pessimistic forecasters have stated that the saturation point had just about been reached in conversion from steam to diesel locomotives on the American railroad scene, and this has become something of a bug-a-boo, but it never materialized. How wrong the forecasters of trouble were is reflected in an announced plan to expand the LaGrange plant some 42% over its present 55½ acres under one roof where more than 9,000 employees are working, supplemented by 2500 in the Chicago plant where various parts including crankcases and oilpans are made. It is worth pointing out here and now that the fears of saturation building of diesels are usually groundless. Good engines, honorable dealing, fair prices and normal national prosperity will keep the market stable.

Market Builders: In discussing the current demand for dieselized construction equipment with a dealer in Connecticut, he said, "Your big news right now is the rebuilding of Route No. 1." He was not stating that the news value came from the improved transportation facilities. He was thinking in terms of loaders, shovels, draglines, trucks, scrapers, etc., all driven by diesel engines. The meaning was obvious. Some less obvious demands for more diesels are of interest and I shall call off only a few of them. Sewage system recently contracted for in Northern New Jersey will call for another $20 million. A large oil company decided to step up marketing facilities and appropriated $½ million. New Jersey decided to do something more about exterminating mosquitoes, and drainage work will call for dieselized equipment. Trouble with floods prompted a $10 million expenditure to protect a Pennsylvania city. A Utility Company has decided to expand its power house and so it goes. These are the projects which make markets for dieselized construction equipment. They constitute an indirect approach like the building of boats or the introduction of a new kind of locomotive.

The Free Piston Engine: In the endless search for higher efficiency and greater economy in power production, the free piston engine is probably destined to find a place for itself all in due time. Meanwhile, A. F. Underwood, of the General Motors Research Staff has made public some interesting details of what is called the GMR 4-4 Hyprex engine of 250 hp which has been installed in an automobile that looks like something we may expect to see on the highways in the not too distant future. However, it is apparent that it will be some little time before we encounter such cars powered by free piston engines. The engine provides the gas with which to operate a very small turbine of high efficiency. It, therefore, occupies the same position in the power production scheme as the boiler in a steam turbine plant, with the noteworthy technological advantage of higher thermal efficiency. The weight runs 3 to 5 lb per hp, but the bulk is somewhat greater than this weight would seem to indicate.

While it might be ever so interesting to review the design elements presented by Mr. Underwood, most engineers will obtain the complete paper. I should like to answer one or two questions which the paper and the demonstration of the engine in an automobile naturally prompt. Obviously the engine is on its way into the power field. At the same time it will be refined considerably before it can be fully utilized with its inherent advantages of ability to burn any kind of liquid fuel at about the same rate per hp as the diesel; its freedom from vibration; its ability to generate a central power supply for highly efficient turbine operation at distant points. These are all excellent characteristics and more than one manufacturer is endeavoring to utilize them. It is perhaps significant at the same time to note the absence thus far of references to the more commonplace operational factors such as the rate of lube oil consumption, cylinder wear, etc., which are a part of the day-by-day considerations of the operators of the conventional engines. When we get down to such levels, the free piston engine will be in general use with all of its inherent advantages over other forms of power. It seems to me, however, that the diesel and gasoline engines will be with us for a long time still. Nonetheless, Mr. Underwood gave us a fine treat and a very interesting glimpse into the future. So did the many men who discussed the paper. It is very evident that the free piston engine is an important part of the future plans of many major manufacturers of power operated equipment.

Flexible Tubing: So many improvements are made in diesels so fast as to take our minds off many of the elements contributing to over-all success of the engine. These items may seem to be commonplace at times, but they are not. I will therefore discuss some of them in these columns. I have in mind the importance of flexible tubing and more especially flexible connections in the exhaust lines. Its importance came to me in a very dramatic manner on a ship at sea in heavy weather on which slipjoints had been used in the exhaust lines and apparently the shipyard had not correctly calculated the amount of exhaust pipe expansion between the silencer and the heavy, water jacketed, cast iron exhaust manifold. Also the ship was built of wood which is a form of construction known to flex considerably with changes in the stowage of heavy cargo from voyage to voyage. At any rate the slipjoints bottomed and the weight of exhaust line started snapping the studs holding the manifold to the engine. A good half ton of metal in one piece was going adrift. This was serious. If we blocked the manifold in place without bolting it we would still have bad leakage of gases containing some

sulphur fumes, nontoxic and fairly well driven out of the engine room by the ventilating system. The air compressor took air from the engine room, sulphur fumes in intercoolers made dilute sulphuric acid of the condensate and this in turn made sulphate of iron out of the high pressure piston rings and that would eliminate injection air essential to operation. To put the manifold back in place we had to shut down the engine, let it cool, disconnect swing clear, set up old man and ratchet, drill and retap the stud holes, make new studs out of cold rolled steel, assemble the job and hope it would hold together until we could make port and have the main exhaust lines shortened.

I have mentioned only one of dozens of ways we could and did get in trouble without flexible tubing which was not then an immediate solution to our problems of expansion and vibration control for the makers of the stuff had not perfected their techniques and it sometimes was troublesome, too. While the diesel was coming of age, the bugs in flexible tubing were fairly well cleared out and now no one questions its quality and durability nor its ability not only to cope with temperature variations as great as we find in the exhaust lines, but many other adverse conditions. In its numerous kinds of materials, flexible tubing effectively isolates many kinds of vibration, withstands the hammer blows of hydraulic pulsations, resists the corrosive action of sea water, simplifies tubing connections, reduces the cost of numerous installations and all-in-all it has proved to be one of the extremely important aids to the development and more universal use of diesel engines.

Anchor to Windward: Over a long period of industrialization in this country fear of over production has cropped up. Usually such fears have been groundless, but sometimes not. Currently a vast number of diesels drive construction equipment required to build superhighways and for the long-range road building program now under way. Many small manufacturers of diesels fell by the wayside because they lacked the volume and therefore the capital to go into mass production. The fringe markets in which the small manufacturers failed to survive are now coveted outlets for engines produced to meet the specific needs of tractor, highway transportation and railroad work. It appears that stationary, marine, portable and general industrial applications are looked upon as anchors to windward, by means of which, it is hoped, there will be no drifting on the rocks if a business slump should come. A top level executive in one of the largest corporations making construction equipment recently said to me, "We will not pass up any opportunity to sell diesels profitably in any market. In this respect we are strong believers in diversification."

What is apparent in this entire turn of events is faster improvement in diesel design making far better engines available to the purchasers, more of whom can succeed in their businesses with the help of such engines. As for the lamented loss of the small independent manufacturers, that is pretty much a thing of the past. We cannot change it. We can anticipate a better economy in all walks of life as the result of greater concentration upon the perfection of machinery, particularly diesel machinery.

New Research Chief

Irving Halpern

Irving Halpern is the newly appointed Supervisor of Research and Development for Enterprise Engine & Machinery Co., San Francisco. He succeeds Charles Carmichael, who resigned. Halpern is a ten-year veteran of diesel engineering research and design activity with Enterprise, and for the past five years has held the position of Senior Research Engineer. Halpern's appointment was announced by Bruce Robbins, manager of Engineering at Enterprise, who noted that Halpern has been closely involved with Enterprise's advances in turbocharging techniques during his entire association with the engine manufacturing firm. Robbins also stated that this valuable experience will continue to contribute significantly to the design and performance of Enterprise diesels. He pointed out that during the post-war period, production of turbocharged engines had jumped from a small fraction of total Enterprise output to a current figure of nearly 80%. Halpern graduated in mechanical engineering from the University of California, worked briefly in the engineering department of Douglas Aircraft Co., and spent three years' service as an Air Force bombardier in World War II, before joining Enterprise.

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CLUTCHES

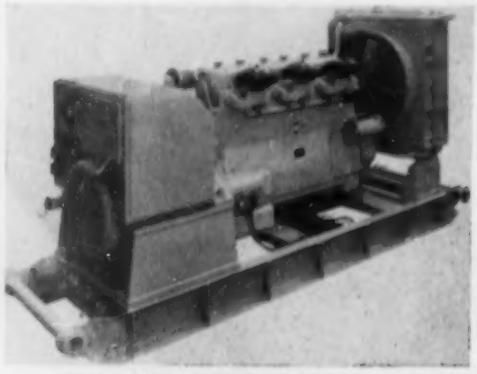
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

Diesel Engine Flywheel Alternators

The development of a new type lightweight alternator design to take the place of the engine flywheel in diesel generating sets is announced by the Brush Electrical Engineering Co., Ltd. The design incorporates a new voltage control system known as the Rectifex. Principal advantages claimed for the new alternator are that it *is* only half as long and weighs little more than half of a conventional machine. There is, however, no rotating exciter to maintain, owing to the static excitation principle employed. The features mentioned above are not new, of course, so far as small diesel generating sets are concerned. Earlier designs from other manufacturers have included some of these features, but Brush claims that they have combined all the ideas successfully in the new diesel generating sets.



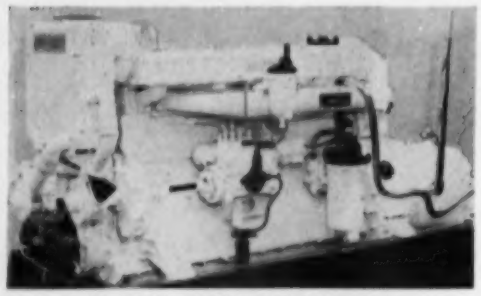
Petter-McLaren diesel alternator set with Brush flange mounted flywheel type self-regulating alternator installed. This set has an output of 110 kw at 1800 rpm for 60 cycle operation.

The yoke (field system) of the new alternator is designed to couple direct to the flange end of the engine crankshaft and to rotate about the inside of the armature, which is stationary. This results in two main advantages: (1) the rotating yoke has a considerable flywheel effect and replaces the conventional engine flywheel, thus reducing weight, cost and length; (2) the stationary armature is of simple construction and has a much lower iron loss than an armature of normal design. Supplementary advantages arising from the design are that a straight forward ventilating system with large inlet and outlet areas can be used, a large rotating mass is available to dissipate heat and the complete machine has a neat and compact appearance. The primary advantage of the new Rectifex system of excitation and voltage control is that it is completely static.

The steady state characteristics are extremely good, and although a nominal regulation of only plus or minus 2½ per cent is guaranteed, a much closer regulation than this is inherently possible due to the very large amplification of the system. Response to transient load changes shows a considerable improvement on that given by machines with automatic voltage regulators. Parallel running is possible with both similar and dissimilar sets, provided the latter have reasonably stable drooping voltage load characteristics. Generally a three per cent voltage droop from no load to full load is required, but this can be improved upon in many cases. A further advantage of the Rectifex static excitation system is that in the event of failure of any of the components, other than the main rectifier, hand control can be arranged.

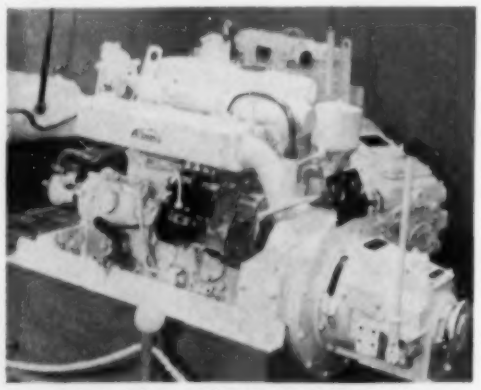
New High-Speed Marine Diesels

Diesel engines from established Leyland and Albion series have been chosen as the basic prime movers for a new range of marine diesel engines now being marketed by Ajax Marine Engines Ltd., of Knutsford, Cheshire, England. There are five engines in the new range, three using Leyland diesels and two using Albion units. The three Leyland sets are the Ajax Amazon, Ajax Apollo and Ajax Atlanta. The Albion Albacore and Albion Albatross complete the range.



Ajax Apollo marine diesel unit utilizing a Leyland diesel developing 95 to 125 hp at 1600 to 1800 rpm.

In the case of the Leyland units, the smallest of the three makes use of a Leyland six-cylinder engine of 65 to 90 bhp at 1,800 to 2,200 rpm. The medium-powered unit is of 95 to 125 bhp at 1,600 to 1,800 rpm and the largest of the three provides 115 to 150 bhp at 1,800 to 2,000 rpm. Both of the Albion-engined units are of four-cylinder design with outputs of 30 to 40 bhp at 1,400 to 1,600 rpm in the case of the Albacore, and 50 to 65 bhp at 1,700 to 1,800 rpm for the Albatross. A feature of all the units is that no exposed drives are used, all running parts being enclosed and lubricated. Reverse and reduction gears are fitted which will transmit equal power, either ahead or astern, and the electrical equipment, using a 24-volt system, is fully protected against salt water atmosphere. The reverse gear, moreover, can be manually or hydraulically operated and a range of reducing gears are available with ratios as high as 4.38 to 1. Other extras which can be fitted include direct-driven bilge pumps, automatic temperature and pressure warning devices, cooled exhaust manifolds, forward power take-off for auxiliary drive and hydraulic starting equipment.



The Albion Albacore marine diesel unit with an output of 30 to 40 hp at 1,400 to 1,600 rpm. No exposed drives are used, and all running parts are enclosed and lubricated.

Alternative cooling systems are available using direct sea water or the thermostatically-controlled closed system by fresh water which, in turn, is cooled by sea water through a heat exchanger or by a keel cooler. Arrangements are incorporated for driving a total of three pumps for sea-water circulation, fresh-water circulation and the bilge. Any one or all of these can, according to engine type, be mounted on and driven positively by the engine. For complete internal closed-circuit cooling, a combined heat exchanger, oil cooler and header tank is mounted at the forward end of the engine. Where keel cooling is employed the heat exchanger is replaced by a simple header tank.

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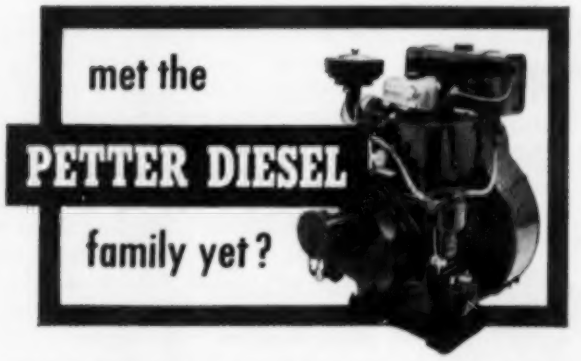

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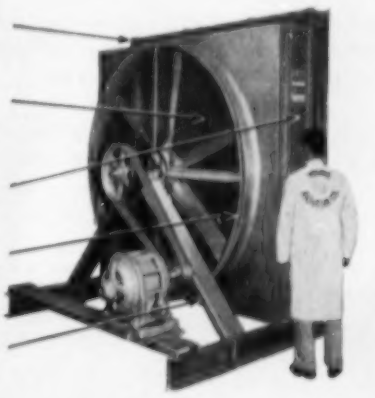

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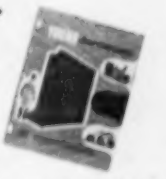

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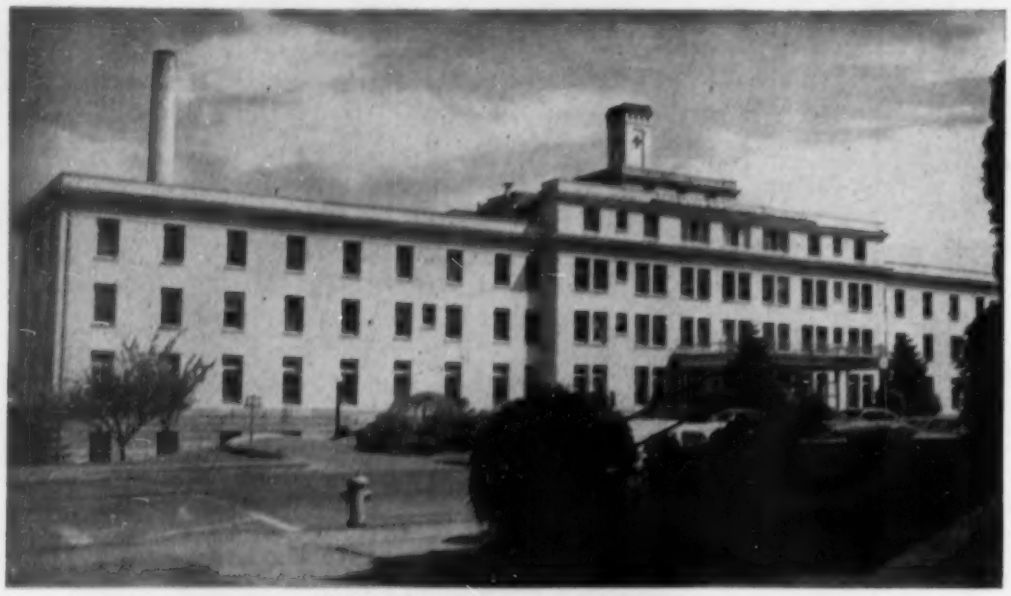


Exterior view of Tacoma General Hospital.

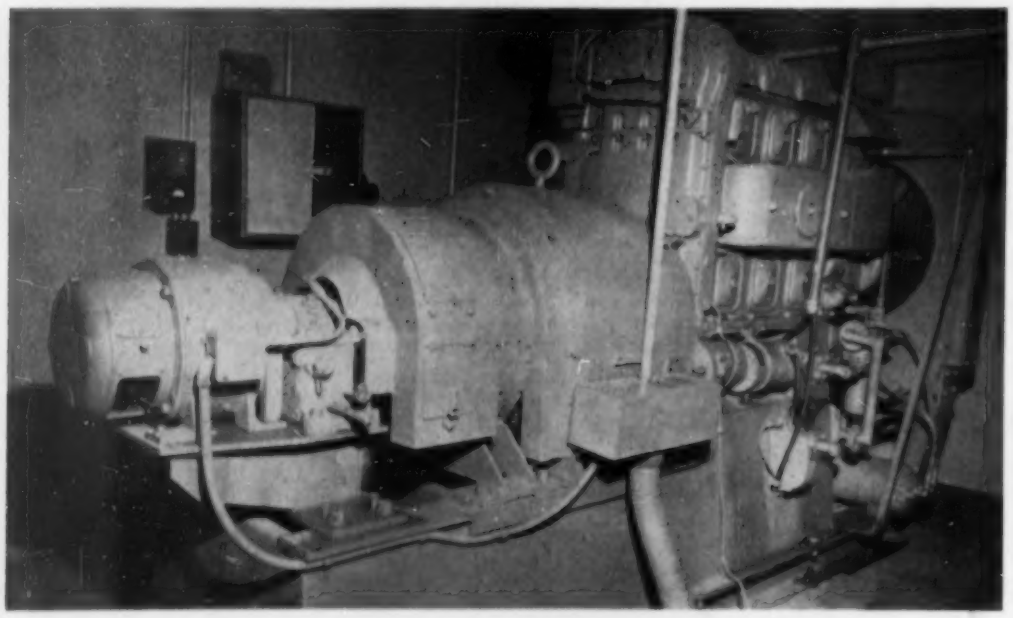
TACOMA HOSPITAL GETS EMERGENCY DIESEL PLANT

By CHARLES F. A. MANN

TACOMA has long been one of the important hospital and clinic cities of the Pacific Northwest, due to its peculiar part in the pioneer development of the region. With very large hospitals operated by various state, federal and other agencies, in addition to the large Northern Pacific Beneficial Association Western hospital, the General Hospitals have kept pace in making the City an important medical center serving a wide region.

Most important general hospital is Tacoma General Hospital, the Fannie Paddock Memorial, to list its full corporate title. Founded as the city's first major institution of its kind by pioneer Episcopalians, it has grown through endowment and wise handling of its income, to a dominant position since the late 1880's when Bishop John W. Paddock gave it its first small start with aid from his Church, and grateful followers named it after his wife. During the past ten years, the Tacoma Orthopedic Association in a public service campaign almost without parallel anywhere on the Pacific Coast, had to build a large children's hospital. When it had finally raised over $450,000, steps were taken to merge the estate of the late Dr. Albert Wellington Bridge, founder of the Bridge Clinic, the first group medicine organization on the Pacific Coast. Dr. Bridge, a bachelor, died leaving his entire estate to found a hospital or endow hospital activity at Tacoma General, to be named in honor of his mother, Mary Bridge. After a long series of legal maneuvers the Bridge estate and the Orthopedic trust funds were merged to build the $800,000 Mary Bridge Hospital, opened in 1955 as the second Orthopedic Hospital in all of western Washington.

General Motors Cleveland Diesel emergency 100 kw generating plant with Marquette governor in basement of Tacoma General Hospital.



The site is a convenient block away from Tacoma General, and all utilities and many group services are provided by TG, though Mary Bridge Hospital is under entirely separate management. With power and heat from a common plant, it is natural that when the directors of each hospital planned to protect the electric power supply by emergency plants located in the basement of each hospital, the two installations would be done simultaneously.

Arrangements were made with Star Machinery Co. of Seattle to supply a 100 kw set for Tacoma General's extensive emergency power needs. This hospital has an extremely varied set of facilities and the whole top floor is devoted to elaborate surgery layout. The rated capacity is 215 beds plus 60 maternity beds, together with research, pathological, radiological and X-ray therapy laboratories each with its own staff. A large nurse's home and training center occupies a separate new building reached via a pedestrian tunnel under K street.

Its library and classroom areas are spread over 4 floors. Elevator operations, plus surgery and maternity ward requirements in a power failure dictated the capacity of the power installation.

The Mary Bridge hospital is housed on 3 compact floors served by a single elevator and with relatively small surgery facilities; a 25 kw set was found adequate. The Tacoma General plant consists of one General Motors Model 3-268 A diesel driving an o/o Westinghouse 3 phase 60 cycle 4 wire 120/208 volt generator. Output is 100 kw/125kva at 1200 rpm. No automatic controls are fitted on this installation. A 5 inch Kittell muffler is fitted, along with flexible engine exhaust hose by Flexonics Corporation of Chicago. A La Marche trickle charger keeps the Exide starting batteries charged automatically. The General Motors diesel is regulated by a Marquette governor.

The Mary Bridge hospital installation features a Katolite Model 55 25 kw/30kva Katolite generator, delivering 3 phase 60 cycle, 4-wire 120/208 volt current at 1800 rpm. This unit is driven by a 6 cylinder, 4 cycle 55 hp Chrysler industrial engine. Full automatic controls are fitted to this unit by Custom Built Controls. Their model GRW unit provides automatic engine cranking on power failure, and is fitted with high water temperature and low oil pressure safety shutdown controls.

Already both units have been tested in actual operation by unique winter thunderstorms that have plagued the area this past winter and disrupted power supply from the City of Tacoma's central municipal system.

DEMA Appoints Corporate Secretary

Robert L. Stanley

At the Diesel Engine Manufacturers Association board meeting held in New York City on Thursday, June 21, Robert L. Stanley was elected to the position of Corporate Secretary of the Association. In this new capacity, Mr. Stanley will take over the active management of DEMA on January 1, 1957. The headquarters of the association will be moved from Chicago to Washington, D.C. on or about December 1, 1956. Bob Stanley has been with DEMA as Educational Director since February 16, 1953, and brings to his new responsibilities a rich background in diesel engineering and research.

Harvey T. Hill, Executive Director of DEMA, who has served the association for the past 13 years will continue in this post until the end of this year, when he will retire.

Two-Cycle Engines Can and Do Run at Variable Speeds

By R. L. Boyer*

In some quarters there is an erroneous notion that if an internal combustion engine must be run at variable speeds it should be a 4-cycle unit. Actually, there is little if any difference between the 2-cycle and the 4-cycle engine with respect to the ability to operate at varying speeds. A survey of the field provides three reasons why some 2-cycle engines fail to perform well in variable speed operation. These reasons are: 1. Ignition. 2. Gas Pressure. 3. Lubricating Oil Pressure.

No fundamental reason could be found since the 2-cycle engine will scavenge well at almost any speed. For simplicity many engines have been equipped with magneto ignition rather than battery ignition. Unfortunately, many magnetos will not perform well at low speeds. Present-day magnetos do perform well to a point considerably below half speed and many of them to one-third speed or lower. Obviously this ignition characteristic applies to either 2-cycle or 4-cycle.

Perhaps the only characteristic chargeable to the 2-cycle engine is that it is somewhat sensitive to fuel-gas pressure. While the engine can be operated at half speed with full gas pressure, it is easily stalled if it is suddenly returned to full speed. Control equipment which re-establishes the speed slowly will eliminate this difficulty. The installation of variable gas pressure controlled by speed, of course, completely eliminates the difficulty and makes for a better performing engine at all speeds. The field survey indicated that in at least a few cases operators had indicated that the 2-cycle engine would not perform well at low speed because its lubricating oil pressure reduced too much. Obviously, a lubricating oil pump does not know whether it is on a 2-cycle or 4-cycle engine and we suspect that some 4-cycle engines may have been condemned on this same basis. Actually, the probable reason that the lube oil pumps was charged as being of insufficient capacity was that some pressure alarms may have been set too high and may have even shut down the engine when the speed was reduced.

There is a mistaken impression that the full lubricating oil pressure must be maintained at all speeds. Actually, lubricating oil pressure is required not so much for lubrication as for the circulation of a proper amount of lubricating oil for cooling purposes. If the engine is reduced to half speed, the lubricating oil pump, of course, delivers half its full capacity, which is ample for all purposes because the engine needs only half as much lubricating oil when putting out only half as much power. To put through half as much lubricating oil requires only one-fourth as much lubricating oil pressure and it is perfectly logical, therefore, that the pressure should fall off as speed is reduced. It is obviously wise to positively operate alarms and control equipment and it is conceivable that engines not sold for variable speed do have ample pump capacity to do this. If they do not, the pump capacity can be increased whether engine is 2-cycle or 4-cycle. We have made an extensive investigation of this problem and find that our 4-cycle engines are controlled by exactly the same requirements as the 2-cycle and that they are equally responsive in variable speed operation.

**Vice President and Chief Engineer, The Cooper-Bessemer Corporation, Mount Vernon, Ohio.*

Inland River Reports

By A. D. Burroughs

LEGISLATION, blocking delays, the American-Commercial Barge Line merger, more announcements of river sites by industry, plus a general upsurge of activity cut through the cross current of conversation along inland rivers.

TWO MORE Dravo-built towboats, *Eastern* and *Western*, hit the inland waterways to join the fast-growing Union Barge Line fleet. The 166- ft, 3500 hp vessels are similar to the Union's *Southern*, the 3000 hp boat built in 1952, and equipped with Superior engines.

A LARGE civic delegation, a part of the day's ceremony for the new dock at Jefferson City, Mo., met Federal Barge Line's *Helena*, the steamer-converted-to-diesel, as she used the power developed from GM-12-567 engines to deliver 175 tons of corrugated steel cover sheets, the first cargo to the new river dock.

THE Cooper-Bessemer engines developing the 2400 hp for the new *Carcrosse*, the twin-screw towboat recently finished by St. Louis Ship for Cargo Carriers, Inc., passed all final trials with flying colors.

THE *George Birnie*, Western Transportation Company Towboat, hit the news transporting what is considered to be the largest tow pushed up the Columbia. Twin 1600 hp Fairbanks-Morse Model 38D8⅛ op engines provided the power for the job, the tow of 1,553,665 board feet of hemlock, the equivalent of 382 full-loaded 60 ft logging trucks, making the trip upstream, about 100 miles in less than 56 hours.

TWO turbo-supercharged 12-cylinder Caterpillar engines, each rated at 490 hp at 1,225 rpm, supply the power for the unusual vessel, *Papa Guy*, recently completed at Dravo for Steuart Transportation Company, subsidiary of Steuart Petroleum Company. Plans call for 20 round trips monthly from Washington, D.C., to Piney Point.

PARKERSBURG, the new twin-screw boat named for the home city of her owners, McDonough River Company, W. Va., has been delivered by the Barbour Metal Boat Works, St. Louis. Measuring 53 x 17 x 6½ ft, two GM (Detroit) 6-110's supply the 440 hp for dependable service on the Tennessee River.

ANOTHER Tennessee River boat often favorably reported is the *L. W. Sweet*, the Pure Oil Company boat built in 1950 by Sturgeon Bay Shipbuilding Company. Formerly named the *R. H. McElroy*, the 2900 hp at 720 rpm is developed from the Fairbanks-Morse 10 cyl. engines.

OLD ABE, another Barbour-built boat, is the new twin-screw 450 hp harbor boat busy on the Green River for her owners, the Peabody Coal Company. Measuring 51 x 20 x 7 ft 2 in., this one carries familiar names such as Kahlenberg, Onan, Beebe, Jabsco, and two GM (Detroit) 6-110's for main propulsion.

A TRIO of Enterprise DMQ-36 engines developing 1,325 hp each at 330 rpm will power the planned 3975 hp towboat to be named the *Toltec*, recently ordered by Lea River Lines, Inc., Wilmington, Del. Designed by A. M. Deering, Chicago naval architect, construction is slated soon at the Nashville Bridge Co.

STURGEON Bay Shipbuilding and Dry Dock Company will build the twin-screw vessel on schedule for the Lea River fleet. To be named the *Dispatcher*, it will be powered by two Enterprise DMM-38 engines, each rated at 675 hp.

THE *John James*, the 65 x 18 x 6 ft 6 in. towboat built by Missouri Valley Steel, Inc., is the new addition to the Massman Construction Company fleet. Equipment includes two GM (Detroit) 6-110's, Coolridge propellers, Maxim silencers, Witte diesel-driven auxiliary generator, along with Fairbanks water system pressure set.

MIKE MURPHY will be the new name for the *Margaret Dawson*. This 500 hp twin-screw towboat built in 1941, powered by two Superior engines, has been sold by the Pfaff and Smith Builders Supply Company, Charleston, W. Va., to the J. T. Murphy River Transportation Co.

WESTERN Machinery and Engine Company, GM-Detroit dealers at St. Louis, supplied the two new Model 6-71 engines rated at 147 hp each for repowering the popular towboat *Maud;* this busy boat operated by the Economy Boat Store, Wood River, Illinois.

THREE Caterpillar engines, each rated at 650 hp, will powçr the new towboat now under construction at Vicksburg Marine Ways. Reportedly owned by Melvin King, the boat is scheduled for September launching.

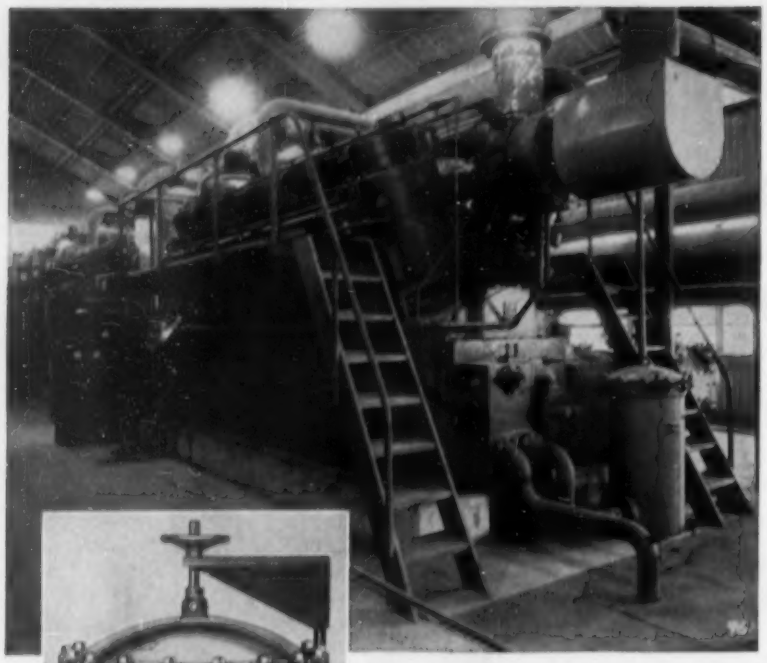
UNDER construction now at Calumet Shipbuilding and Drydock Co., Chicago, is the new tug for McWilliams Blue Line fleet. Designed for service in the canal route, power will be provided by the 2,000 hp GM (Cleveland) turbocharged diesel.

THE *Ira C. Bill*, sternwheel towboat owned by Tuel Towing Company, received numerous comments and amazed glances when the 200 hp developed from the International UD-24 diesel engine was put to the unusual service of towing a house from the site of the new aluminum plant at Buckhill Bottom to Hannibal, Ohio.

AT ST. LOUIS recently, we saw the new and modern *Waverly*, the 90 x 26 x 6.5 ft towboat completed at Houston for the Sioux City and New Orleans Barge Lines. Excellent performance was observed from the two Enterprise engines, rated at 500 hp each.

APPRECIATION expressed for the photos of the *Quiver*, the Cummins-powered towboat owned by Chicago & Illinois Midland Railway Co., and the recent picture of the Nordberg-powered *Valley Transporter*, owned by MVBL.

After Two Years' Service— Clean as a Whistle Inside with NUGENT *Full-Flow* FILTERS



Nugent 1555 "Extended Area" Filter of the type used by El Paso at Midkiff. These filters are equipped with laminated crenulated fiber disc recharges which have had an average life of 2500 engine hours at the Midkiff Station. They remove solid particles as small as 2 microns but do not remove additives in detergent oils. Recharging requires only ten minutes.

Nine Ingersoll-Rand turbo-charged gas engine driven compressors at the Midkiff Station of El Paso Natural Gas Co. have been equipped with Nugent Filters since installation. The full-flow filtering provided by these filters has protected the bearings and kept these engine-compressors clean inside for well over two years. Service like this has resulted in many repeat orders from El Paso Natural Gas Co. and other leading pipe line companies.

To give your engines and compressors the protection they deserve, specify Nugent *Full-Flow* Filtering. This means that *all* the oil in circulation passes through the filter every cycle before going to the bearings . . . and it means that particles as small as a few microns are removed before they can damage precision parts. Write for helpful descriptive literature, today.

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Florida Diesel News

By **Ed Dennis**

THE T. M. T. Seatruck, *Lloyd,* was launched by Merrill-Stevens Drydock & Repair Co. in Jacksonville for the T. M. T. Trailer Ferry Inc. It has a capacity of 4 full size loaded trailers or 18 automobiles. Specially designed to carry Roll-on and Roll-off truck trailers, its dimensions are 64 x 31 ft, with a draft of 6 ft. Its power comes from 2 General Motors 6-110 diesels developing 520 hp; it operates at a speed of 12 knots and will be placed in service between Puerto Rico and the Virgin Islands.

A MODEL HRM 600 Cummins diesel will power the new 65 ft *Miss Beaufort,* owned by Charley Davis. The 165 hp diesel will drive a 44 x 36 four blade propeller. This is the second vessel built by him in his backyard in Beaufort, North Carolina.

THE TWO Cummins dieselized, steel ferry boats being built in Miami are to replace two old wooden ferries powered by gasoline engines. After completion, construction is expected to start on another pair making a total of 4 modern dieselized ferry boats for the Compania Popular de Transporte Inc. of San Juan, Puerto Rico.

RECENT GM diesel additions to the Ft. Lauderdale marine fleet are the *Minna-Lee,* owned by the Pinking Shears Corp. with 2 GM 6-71's and James Hunt's 60 ft motor sailer, the *Pegasus,* with a 4-71 and GM hydraulic 2:1 r&r.

TWO UD 525 International diesels for Morgan Mines, near Lake Wales, as prime power for Farmers Mfg. Co. lift pumps being used for an irrigation system on farm land.

KEY WEST saw the launching of the 70 ft shrimp trawler *Pequod* named after the whaling ship in the novel Moby Dick. Powered with a D342 Caterpillar diesel instead of sails, it is owned by Weymouth Bros. and W. Gibson. The 210 hp Cat diesel was sold by Shelley Tractor & Equipment Co., Miami.

IN CIUDAD del Carmen Campeche on the Gulf of Mexico, the *Oro Blanco #1* was launched by Isaac Sosa. This 57 x 17 ft shrimper is built entirely of Mexican hardwood such as mahogany, jabin and pucte. It is powered with a model HRMS 600 Cummins diesel rated 225 hp at 1800 rpm and a Twin Disc 4.38:1 r&r gears. Another *Oro Blanco* now under construction will also have Cummins diesels.

TWO International TD 18 hydraulic bulldozers and a Galion road grader with a Cummins diesel for the Florida State Road Dept. from Florida Georgia Tractor Co., Miami.

RECENT Cummins diesel installations for Hi-way transportation included 2 Reos with model JT-6-B for Freeman & Sons of Jacksonville, a NHB 600 in an International for A. C. Rainey and W. H. Vail repowered 3 Mack tractors with NHB 600's.

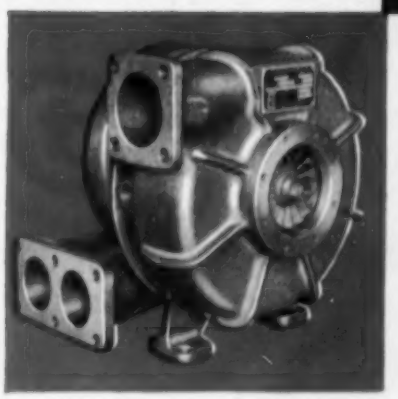
FORT LAUDERDALE, the home of Powell Bros., whose specialty is bridge construction, an Ingersoll-Rand #600 air compressor unit powered with a General Motors 6-71 diesel.

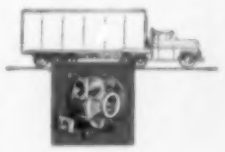
THE *Lady Luck of Nassau,* B.W.I., was repowered from gasoline engines to two Hercules model DIX 6 diesel engines. Each are rated 150 hp at 3000 rpm with Paragon 2:1 r&r gears, at the shops of Auto Marine Engineers, Miami.

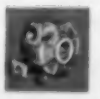
CARIBBEAN Machinery Corp., Hialeah, has been appointed distributor for the Marion Power Shovel for the South Florida area; Cummins diesels are used for power. Vibro-Plus road rollers with Waukesha diesels are also handled by this firm.

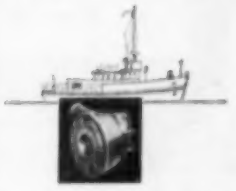
Millions of hp of Experience!

...keeps ELLIOTT ahead in turbochargers









ELLIOTT has a background of more than 16 years experience in DESIGNING, MANUFACTURING and APPLYING turbochargers to diesel engines. During this time, millions of horsepower of diesel engines have been turbocharged by Elliott. These turbocharged engines cover the field—stationary plants, large motorships, fishing vessels, luxurious yachts, railroad locomotives, trucks, off highway tractors, well drilling rigs, etc.

This experience means added assurance of dependability in turbocharged diesel engine performance. Make sure your next diesel engine has a "performance-proven" Elliott turbocharger.

ELLIOTT Company
JEANNETTE, PENNSYLVANIA

MS-1

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

Improved Fuel Economy

"Today's modern oil and dual fuel turbocharged engines give us about 40 percent better fuel economy than we could get just before the war years," said W. E. Wechter, Manager of Worthington Corporation's Engine Sales Division, in speaking of engines in the 200 to 5000 hp class. During a recent interview Wechter stated, "The old type spark ignition engines have progressed through numerous stages of engineering development. About twenty years ago the typical gas engine consumed 10,000 Btu's per bhp/hr. It operated on a compression ratio of about 6 to 1. Today's modern high pressure turbocharged engines can easily develop a brake hp/hr on 6200 Btu of gas and operate on a diesel compression ratio of 12 to 1. In addition, the fine qualities which have been incorporated, have resulted in greatly lowered operating and maintenance costs."

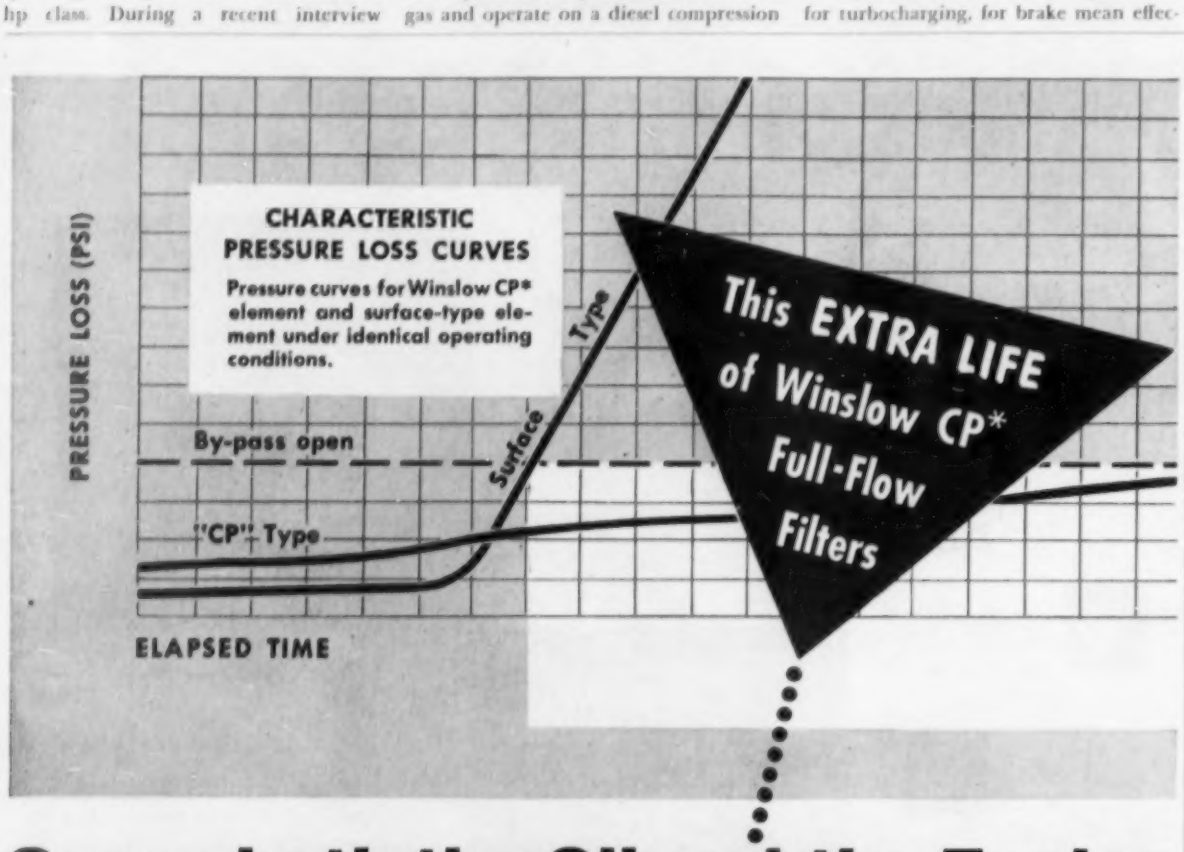
Engineers at Worthington's Engine Division at Buffalo, N. Y. have recently developed and announced a high output, four-cycle engine, designed specifically for turbocharging, for brake mean effective pressures of 200 psi and above. Actually it can be three engines in one; for operation on diesel oil, oil and gas, or all gas. Two types of high output engines were developed to complement various applications in municipal and industrial power plants, water works, sewage plants, for emergency service, semi-portable and portable service, and for topping service in steam power plants. Wechter explained that the one type is a medium speed 900 to 1000 rpm unit that employs a hung crankshaft; while the other is a low speed, 450 rpm engine with the crankshaft bedded in the base. The medium speed unit is presently an in-line type with ratings from 400 to 1400 hp, while the low speed engine is built both in-line and in Vee engines with a range from 1500 to 5000 hp. Wechter said that the reason behind the development of these new designs was to produce a rugged engine, economical of space and foundation requirements that would product more kw/hrs per gallon of oil or per thousand cu ft of gas. The engines are used mainly for driving electric generators, blowers, pumps, compressors, and numerous other types of machinery.

Named To New Post

Thomas J. Farrahy, Jr., has been appointed assistant manager of the industrial advertising and sales promotion department of Westinghouse Electric Corporation, Pittsburgh, Pa. Mr. Farrahy, formerly division manager in charge of electric utility and defense activities for the industrial advertising department, succeeds O. C. Kebernick who has been named administrative assistant to the manager of commercial atomic power activities for Westinghouse.

A native of New York City, Mr. Farrahy was graduated in 1947 from Carnegie Institute of Technology with a bachelor of science degree in management engineering. He joined Westinghouse in November, 1947, as an advertising assistant. In April, 1948, he was named sales promotion representative in the company's New York office, a position he held until August, 1952, when he returned to Pittsburgh headquarters as advertising staff representative. He was appointed division manager in October, 1954.

NOW AVAILABLE! The Completely new Volume 21 of DIESEL ENGINE CATALOG. This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.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PRESSURE LOSS CURVES
Pressure curves for Winslow CP* element and surface-type element under identical operating conditions.
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By-pass open
"CP" Type
Surface Type
ELAPSED TIME
This EXTRA LIFE of Winslow CP* Full-Flow Filters

Saves both the Oil and the Engine

Laboratory tests and operating experience indicate that Winslow CP* filters have as much as 50% more useful life than a surface-type filter. As a result, both the lube oil and the engine are protected beyond normal filter service.

Contractors, for instance, report that useful oil life in diesel-powered equipment has been extended from 80 hours to 300 hours, with Winslow CP* filters.

Most important, engines are protected all the time with Winslow full-flow filtration . . . protected during cold starts, while idling and against excessive dirt . . . protected if a bearing fails. Because of this better oil filtration, engines last longer and require less maintenance. A modest investment in Winslow filters returns substantial dividends.

THE CP* PRINCIPLE

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil from the filter without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material, as illustrated.

WINSLOW FILTERS *CP is fully protected by patents and trademarks

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

Switchgear Bulletin

Design and construction features of Allis-Chalmers indoor and outdoor 13.8 kv horizontal drawout metal-clad switchgear with Ruptair magnetic circuit breakers are described in a new bulletin released by the company. The bulletin shows how the heavy component parts are located toward the bottom of the 13.8 kv Ruptair breaker to insure a low center of gravity and good stability when handling. It also tells how it takes only two minutes per phase to disassemble the breaker and why horizontal contact separation aids breaker operation.

Adaptability of the stationary structure to fit special requirements is covered in the bulletin along with ratings and dimensions of the switchgear. Copies of *13.8-Kv Horizontal Drawout Metal-Clad Switchgear With Ruptair Magnetic Air Circuit Breakers*, 18B8142, are available on request from Allis-Chalmers Manufacturing Company, 961 S. 70th Street, Milwaukee, Wisconsin.

Electrical Joint Compound

Alcoa No. 2 Electrical Joint Compound, which removes oxide film from aluminum or copper electrical conductors and fittings, is now packaged in a handy plastic squeeze bottle. The new container holds eight fluid ounces and is oval in shape to prevent rolling. The squeeze bottle is easy to carry and to use on the job. Each bottle is delivered sealed. To use, pull the cap and nip off the tip of the spout. The bottle is recapped like a household oil can. Alcoa No. 2 Electrical Joint Compound removes oxide without corrosive effect on the metal itself. After application, the compound, insoluble in water, remains to seal and protect the joint and prevents re-forming of the oxide.

Electrical joints, when properly assembled with Alcoa No. 2 Electrical Joint Compound, are in the same range of contact resistance as silver-plated joints. Excellent connections can be made with aluminum to aluminum or aluminum to copper. The compound, with its squeeze bottle, is another product of Alcoa's Research and Development Laboratories. The new plastic bottles now are available in cartons of 12. Also available for bulk users are 25 lb. sealed pails or one-pint cans.

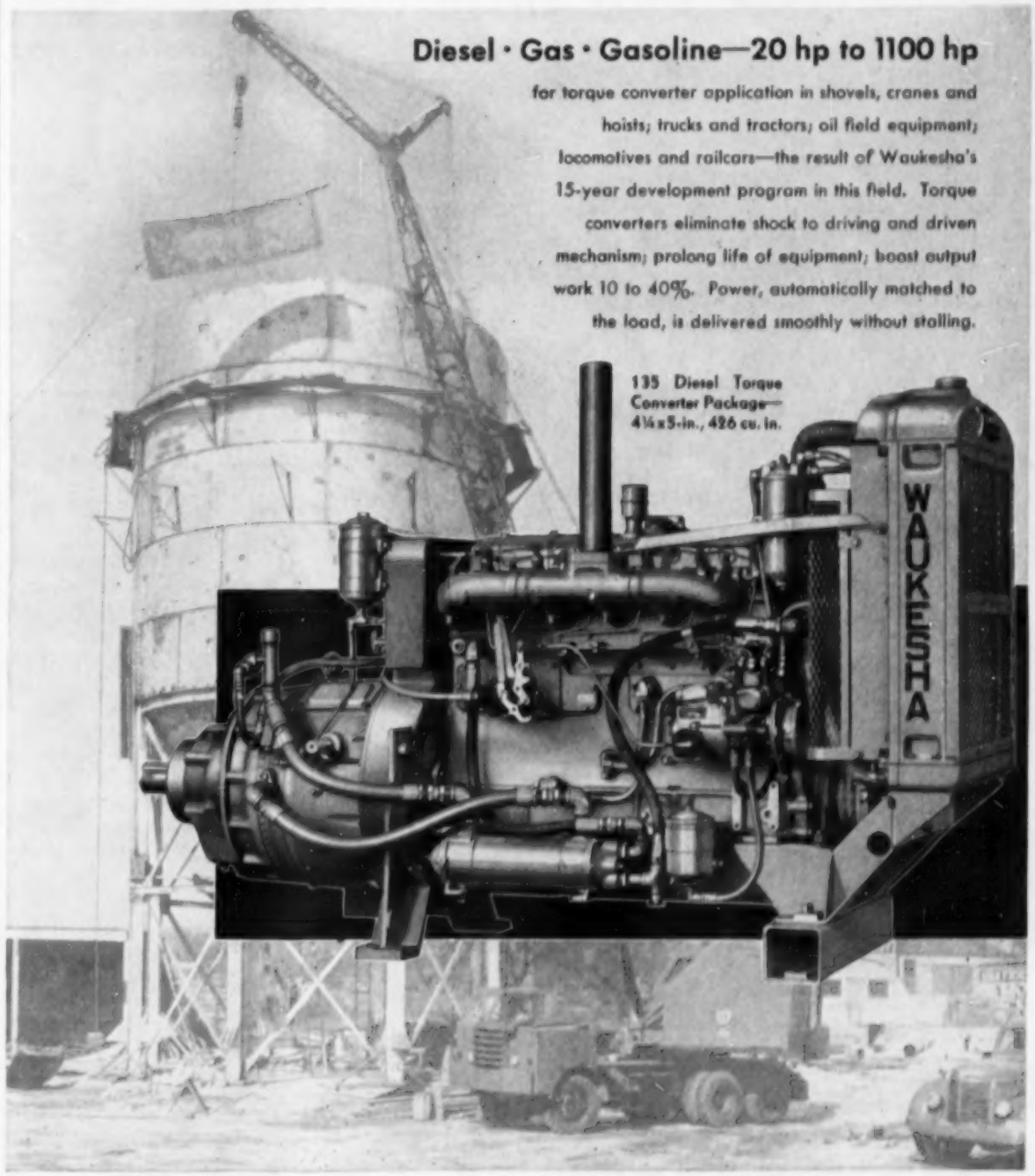
Unusual Well-Servicing Unit

Phillips Petroleum Company has designed a completely hydraulic and air controlled well-servicing unit. It is now in operation in the western Kansas area, under the direction of John H. Province, Well-Servicing Engineer for the company. Large capacity, mobility and ease of operation were combined into the single compact unit on a B-62X Mack truck with a gross vehicle rating of 60,000 lbs. Equipped with power steering and air brakes, the truck operates on liquified petroleum gas with a 9.3 to 1 compression ratio and a 10 speed transmission. An auxiliary brake on the propeller shaft of the truck requires 75 lbs. of air before the truck can be moved. Also, it stops the truck automatically if the air is lost at any time.

Mack executives pointed out the rig's design permits operation with a crew of three, rather than four men. Also, the unit can be in operation in eight or ten minutes after reaching its destination. The Mack carries a new style 66 ft Franks tubular steel telescoping derrick of 100,000 lbs. capacity. With an eight ft base, outrigger legs were eliminated. It can be used at full capacity also without guy wires. A hydraulic pump operated from the truck engine and capable of developing pressures up to 2000 lbs. per sq in. raises and lowers the derrick, while a single 37 in. drum winch handles up to 6500 ft of tubing of 2⅜ in. diameter or 7200 ft of sucker rod.

WAUKESHA

engine torque converter packaged power



Diesel · Gas · Gasoline—20 hp to 1100 hp

for torque converter application in shovels, cranes and hoists; trucks and tractors; oil field equipment; locomotives and railcars—the result of Waukesha's 15-year development program in this field. Torque converters eliminate shock to driving and driven mechanism; prolong life of equipment; boost output work 10 to 40%. Power, automatically matched to the load, is delivered smoothly without stalling.

316

50th ANNIVERSARY Waukesha 1906-1956

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Mid-Continent Diesel News

By Jack F. Cozier

CARSON Machine & Supply Co., Tulsa, & Oklahoma City, Okla., have recently taken over sales and service for International industrial power units for the entire state of Oklahoma.

CITY of Malden Power Plant, Malden, Mo., recently purchased a Fairbanks-Morse model 38D8⅛, 1920 hp, twelve cylinder tri-fuel generating set from Fairbanks, Morse & Co., Chicago, Ill.

CONTINENTAL Oil Co., Ponca City, Okla., has bought six Unit one yard Mariner cranes to be used for offshore drilling on the Gulf Coast. The cranes were sold by Midwestern Engine & Equipment Co., Tulsa, Okla., and are powered by GM 4-71 diesel engines.

MACK C. COLT, Iola, Kan., independent water flood operator, has ordered a 6-71 GM diesel turbocharged torque converter power unit from the Diesel Power Co., Tulsa, Okla. The unit will be installed on a sand frac unit built by Apex Machine & Mfg. Co., Tulsa. This will be the first installation of this nature utilizing this new power unit in the Southwest.

STANDARD Industries, Inc., Tulsa, Okla., received three Cat #12 motor graders to be used for street and state highway construction. The sale was made by McCormick Machinery Co., Tulsa.

OZARK Portland Cement Co., Prior, Okla., purchased a 315 cu ft Joy air compressor powered by an International UD-18 diesel engine. The compressor sold by Butler-Sparks Equipment Co., Tulsa, Okla., will be used for shothole work at the Ozark quarry.

PHILLIPS Petroleum Co., Bartlesville, Okla., has taken delivery on a trailer-mounted pumping unit powered by a model 12107 GM diesel engine driving through an Allison torqmatic transmission on a six cylinder Gardner-Denver pump. The unit will be operated out of Fort Morgan, Col., and was sold by Diesel Power Co., Tulsa, Okla.

BELL Engine Service, Great Bend, Kan., received six 6MO-970 Allis-Chalmers, Buda gas engines to be used on irrigation work in Western Kansas. The sale was made by Allis-Chalmers Mfg. Co., Buda Div., Tulsa, Okla.

TEXAS Engineering & Construction Co., Amarillo, Tex., has had delivered to Liberal, Kan., a Cleveland 140 ditcher from Leland Equipment Co., Tulsa, Okla. The unit is powered by an International UD-350 diesel engine, and will be used for pipe line work.

A B C CONSTRUCTION Co., Tulsa, Okla., purchased a Unit 1020A crane utilizing the power of a 3-71 GM diesel engine with an Allison torque converter. The unit was sold for sewer contract work by Midwestern Engine & Equipment Co., Tulsa.

ROY T. HOKE Materials Co., Stillwater, Okla., bought a Cat 933 traxcavator for handling stock pile materials from McCormick Machinery Co., Tulsa, Okla.

DERBY OIL CO., Wichita, Kan., has purchased an International 406 gas engine for installation on a Gaso pump. The sale was made by Carson Machine & Supply Co., Tulsa, Okla.

HOWE CONSTRUCTION CO., Quincy, Ill., has received two Euclid 14 TDT scrapers from Butler-Sparks Equipment Co., Tulsa, Okla. The units are powered with Cummins NHB diesel engines.

H. D. YOUNGMAN Construction Co.,

for LONG SERVICE and QUICK SERVICING... it's

STRATOFLEX HOSE and FITTINGS

For fuel lines, oil lines, water, anti-freeze, L-P gas, vacuum gage, and air applications. High pressure and low pressure service.

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Detachable, reusable fittings are leak-proof and quick on-and-off.

Buy ready-to-use hose assemblies or make up your own from bulk hose and fittings. Types and sizes for every application at your industrial supply house.

Write for Bulletin S-2D

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How much of your engine maintenance bill is due to repair of breakdowns that could have been avoided—*if you'd had advance warning?*

At a fraction of that cost, Alnor Exhaust Pyrometers offer you a constant check of engine performance—advance warning of

Cylinder Overload **Preignition**
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Get the best from your diesel—minimum fuel consumption per horsepower and long service uninterrupted by foreseeable breakdowns. Get constant protection of your engine, cylinder by cylinder, with an Alnor engineered Exhaust Pyrometer System.

Get Full Information—*Quickly!* Your nearby Alnor Diesel specialist is conveniently listed in the classified directory. Ask him to help you select the Pyrometer and thermocouple assembly designed for your engine. Or send for Bulletin 4361 with complete details of the full Alnor line of Pyrometers.

ILLINOIS TESTING LABORATORIES, INC.
Room 508, 420 N. La Salle St.,
Chicago 10, Illinois

Baxter Springs, Kan., purchased two Cat #12 motor graders for surfacing and road construction. The sale was made by McCormick Machinery Co., Tulsa, Okla.

FRANK WHEATLEY Pump & Valve Mfr., Tulsa, Okla., received one 6MO-672 Allis-Chalmers Buda gas engine to be installed on a pipe line pump, delivery from Allis-Chalmers Mfg. Co., Buda Div., Tulsa.

PIPECOTE Service Corp., Tulsa, Okla., bought a 315 cu ft Joy air compressor from Butler-Sparks Equipment Co., Tulsa. The compressor powered by a Cat diesel engine will be used in an Illinois pipe yard.

PHILLIPS Petroleum Co., Bartlesville, Okla., has taken delivery of a Failing drilling rig powered by a model 807 GM diesel engine from Diesel Power Co., Tulsa, Okla. The engine through an Allison torqmatic transmission powers the drawworks on the rig for use around Fort Morgan, Col.

SOUTHERN PACIFIC Railroad has announced that they will add 154 more diesel engines to supplement the 185 new diesel units put into service in the Southwest last year. The new orders consisting of 90 1750-1800 hp freight diesels and 26 1200 hp with 38 900 hp diesel switchers to be delivered by April of 1957. The units will be manufactured by Electro-Motive Div. of General Motors Corp., Alco Products, Inc., and Fairbanks, Morse & Co.

W. G. BURGESS, Tulsa, Okla., purchased a Cat #12 motor grader from McCormick Machinery Co., Tulsa, for highway construction work.

SUN OIL CO., Yale, Okla., has bought a LeRoi D226 gas engine for installation on a Bethlehem pump, Carson Machine & Supply Co., Tulsa, Okla., making delivery on the engine.

COBBS & BATES, Moyer, Okla., has purchased a Cat 977 traxcavator for striping overburden and road material, delivery by McCormick Machinery Co., Tulsa, Okla.

CANADIAN-PARKHILL Pipe Stringing Ltd., Tulsa, Okla., took delivery on two Unit 1520T truck cranes for use on the Trans-Canada pipe line in Regina, Canada. The two cranes are powered by GM diesel engines and were delivered by Midwestern Engine & Equipment Co., Tulsa.

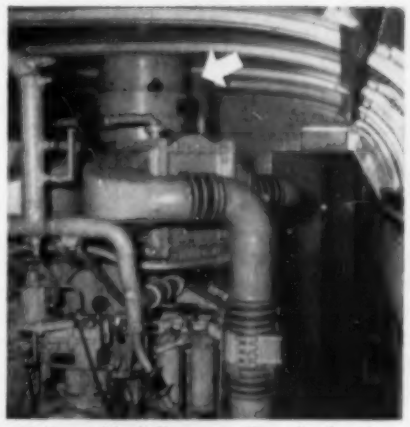
DARR EQUIPMENT CO., Dallas, Tex., Caterpillar dealer, recently sponsored a preventitive maintenance school at Waco, Tex. Over 250 representatives of Central Texas contractors, builders, county officials and their equipment maintenance men were present at the meeting. The Waco meeting was one of a series of maintenance schools conducted to help equipment owners lower operating costs by eliminating downtime and repairs caused by lack of preventive maintenance.

JOE BOMAN Construction Co., Tulsa, Okla., bought a Cat D8 tractor and an 8S bulldozer from McCormick Machinery Co., Tulsa, for highway construction work.

POWER Transmission & Equipment Co., Seminole, Okla., purchased two Allis-Chalmers power units, one a B125 gas engine and the other a W226 gas engine, from Allis-Chalmers Mfg. Co., Buda Div., Tulsa, Okla.

NOW AVAILABLE! The Completely new Volume 21 of DIESEL ENGINE CATALOG. This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

Here's why AIR-MAZE oil bath air filters were chosen for Train-Xplorer



Air-Maze oil bath filter on auxiliary diesel engine of Train-Xplorer.

Large Air-Maze oil bath filter on Train-Xplorer main engine is readily accessible for inspection. Servicing required only at 3 or 4 month intervals.

Baldwin-Lima-Hamilton packed many innovations into the new type locomotive they built for New York Central's Train-Xplorer. Advanced, lightweight design, for o .e. Maybach diesel engines with hydraulic transmission, for another. Naturally, they insisted on the most advanced type of engine air filtration, too. They chose Air-Maze oil bath filters!

Why? Because from their experience with the many outstanding locomotives they've built, Baldwin-Lima-Hamilton knew that Air-Maze oil bath filters were the most effective in cutting engine wear, servicing costs and turbo-charger maintenance.

Independent laboratory tests prove that Air-Maze oil bath filters are the most efficient engine air filters used today. These tests show that the oil bath filter *stops 59% more fine Arizona road dust than the next best filtering device.* Furthermore, they maintain at least 95% efficiency *even at lowest locomotive engine speeds* and generally cost no more than competitive types of filters.

The same advantages that Air-Maze oil bath filters are giving Train-Xplorer are also rewarding dozens of other major railroads throughout the nation. If you are interested in additional facts or case histories showing how Air-Maze oil bath filters are prolonging the life of power assemblies and cutting costs, just write Air-Maze Corporation, 25000 Miles Road, Cleveland, Ohio.

The biggest names in diesels are protected by Air-Maze filters

ENGINE AIR FILTERS
CAR BODY FILTERS

AIR-MAZE

LUBE OIL FILTERS
PASSENGER CAR FILTERS

The Filter Engineers

Gulf Coast Diesel Notes

By Michael T. Pate

PARKER Bros. & Company, Inc., Houston, has bought from Stewart & Stevenson Services, Inc., Houston, two General Motors series 110, model 62206, 6-cylinder diesels, each equipped with 5:1 hydraulic reduction and reversing gear and also one Stewart & Stevenson generating set consisting of a General Motors series 71, model 3061A, 3-cylinder diesel, driving a 15 kw ac generator at one end of its shaft, and a 15 kw dc generator at the other. The three units will be used to equip Sterling Hogan's new yacht *Trail*. The S & S unit will have dual switchboards, the ac power for the air-conditioner, the dc for lighting and auxiliary power.

WATSON Equipment Company, Fort Worth, Texas, has bought through Cummins Sales & Service, Inc., Fort Worth, a 105 hp model JF-6-B1 Cummins diesel, which will be used to power the rotary table of a foundation bore drilling machine.

LOFFLAND Bros. Drilling Company, for shipment to New Iberia, Louisiana, has bought from Waukesha Sales & Service, Inc., Houston, three model LRD-BSU Waukesha diesels, rated 490 hp at 1100 rpm. The engines were secured through Mid-Continent Supply Company, Dallas.

HOUSTON Contracting Company, Houston, has bought from Big Welding Equipment Company, Houston, two 250 amp Lincoln welding generators, each powered by a model DIX4D, 4-cylinder Hercules diesel, rated 40.5 hp.

GULF Oil Company, Houston, has bought two pneumatic two-mile fog signals, each powered by a model GD157 Continental diesel, rated 27.6 hp at 1800 rpm.

S. E. EVANS Mining Company, Linden, Texas, has bought from Stewart & Stevenson Services, Inc., Houston, a series 110, model 122403 twin-6 General Motors diesel to repower a Manitowoc dragline. The engine is rated at 500 hp.

BREWSTER-BARTLE Drilling Company, Inc., Houston, has bought from Waukesha Sales & Service, Inc., of Houston, two model 6WAKDU 100 kw ac generating sets, each powered by a Waukesha diesel, both units to be delivered to the drilling company's operations at Harvey, Louisiana.

JOHN F. BEASLEY, Dallas, Texas, has secured from Cummins Sales & Service, Inc., Fort Worth, Texas, a 300 hp model NRT-600 Cummins diesel which he will use to power a 125 kw portable welding unit.

BROWNING Manufacturing Company, San Antonio, Texas, will power a Browning Rock Buster with a series 71, model 4031C General Motors diesel, rated at 80 hp. The diesel was secured from Stewart & Stevenson Services, Inc., Houston.

HUMBLE Oil & Refining Company, Houston, has bought a dual diesel pneumatic Two-Mile Fog Signal for its offshore work in the Gulf of Mexico. The unit is powered by a Continental diesel, model GD157, driving a Westinghouse compressor.

C. B. DELHOMME, Inc., Houston, has bought from Waukesha Sales & Service, Inc., of Houston, a 10 kw model 10-ROT-63 diesel generating set. The unit will be used for yacht lighting service.

WESTERN Constructors, Austin, Texas has bought from Big Welding Equipment Company, Houston, two 250-amp Lincoln welding generators, each powered by a 40.5 hp 4-cylinder Hercules diesel. The units will be used in pipeline construction.

MEMORIAL Hospital, Houston, is installing a special Stewart & Stevenson automatic emergency generating set consisting of a series 71, model 4030C General Motors diesel driving an S & S model 4GD80S generating unit. The unit is tied in with the commercial power circuits to take over the hospital power load in case of outside power failure.

INTERNATIONAL Minerals Corporation, Hobbs, New Mexico, will repower one of its underground Jeeps with a model 180DLC Waukesha diesel, rated at 42 hp. The engine was furnished by Waukesha Sales & Service, Inc., Houston.

BROWN Lumber Company, Cleveland, Texas, has bought through Stewart & Stevenson Services, Inc., Houston, a series 71, model 4030C, 4-cylinder General Motors diesel to drive a portable sawmill. The diesel is rated at 80 hp.

GULF Oil Company, Houston, has bought two dual diesel pneumatic Two-Mile Fog Signals from Houston Engine

KATO

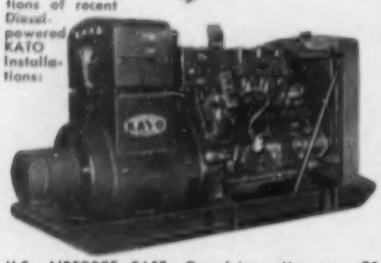
CONTINUOUS A.C. AND STANDBY

GENERATORS

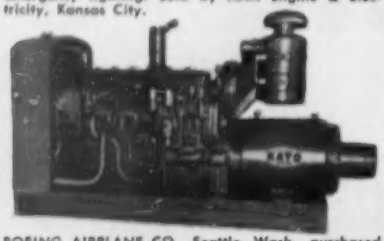
ARE ADAPTABLE TO ALL MAKES OF ENGINES...

SIZES TO FIT ANY NEED UP TO 500KVA

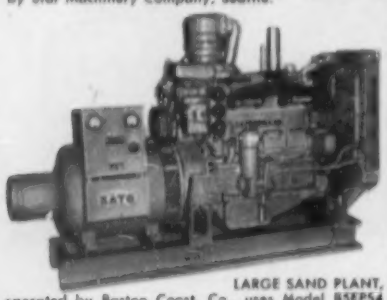
Three illustrations of recent Diesel-powered KATO Installations:



U.S. AIRFORCE BASE, Grandview, Mo. uses 75-KW, 93.8 KVA, 120/240V., 60 cycle, single phase, 1800 RPM KATO Generator, driven by P & H Harnischfeger Model 487-1B diesel engine, for emergency lighting. Sold by AAA Engine & Electricity, Kansas City.



BOEING AIRPLANE CO., Seattle, Wash., purchased 175 KW, 219 KVA, 3 phase, 3 wire, 60 cycle, 1800 RPM, revolving field type KATO Generator, General Motors Model 6Z403-8A diesel engine. Installed by Star Machinery Company, Seattle.



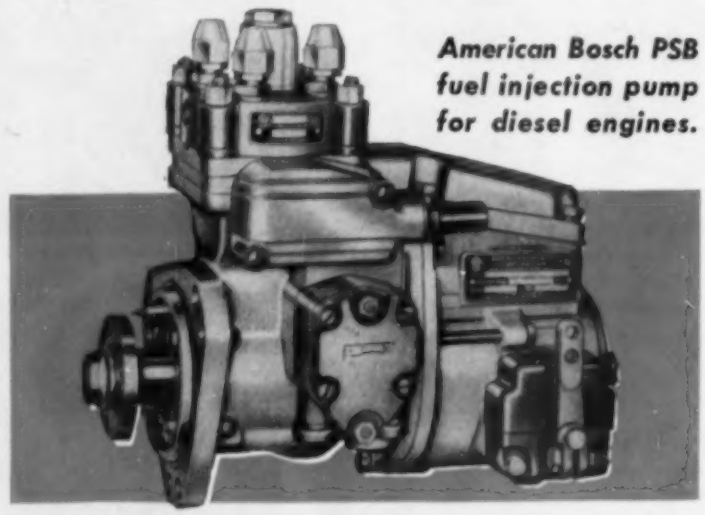
LARGE SAND PLANT, operated by Barton Const. Co., uses Model 8SEP54 150 KW, 187 KVA, 220/440V., 3 phase, 60 cycle, 1800 RPM, 2 bearing, close coupled type KATO Generator adapted to No. 0 bell-housing on Caterpillar D337 diesel engine. Sold by Wm. H. Ziegler Co., Minneapolis.

WRITE

Builders of Fine Electrical Machinery Since 1928

KATO Engineering Company

1443 First Avenue, Mankato, Minnesota



American Bosch PSB fuel injection pump for diesel engines.

Unmatched for service and performance . . .

That's the record of more than 100,000 American Bosch PSB fuel injection pumps now in service—some for as long as five years. The PSB has many features—simple rugged construction, fewer parts, accurate fuel metering and distribution, positive governor control. Easily replaceable hydraulic head permits quick field servicing. All combine to assure top engine performance and economy of operation, long trouble-free life and *low* maintenance expense.

Every American Bosch fuel injection product is backed by an established and growing system of authorized service agencies, fully equipped and staffed with trained personnel to provide quick, efficient repair service.

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4096

& Pump Company, Inc., Houston. The signals are powered by two model GD157 Continental diesels, each driving a Quincy compressor through a torque converter.

BETHLEHEM Supply Company, Corsicana, Texas, has bought a model 6WAK-DBSU Waukesha diesel, rated 305 hp at 1600 rpm, from Waukesha Sales & Service, Inc., Houston. The diesel will be torque-converter equipped for heavy duty.

DELTA Drilling Company, Tyler, Texas, has bought through Continental Supply Company, Dallas, Texas, four Stewart & Stevenson model 2GD32 ac generator sets, for shipment to Delta's drilling operations in Sicily. The generators are driven by series 71, 3-cylinder, model 3030C General Motors diesels.

LATEX Construction Company, Atlanta, Georgia, has bought for shipments to its Fond du Lac, Wisconsin, operations four 250 amp Lincoln welding generators each powered by a model DIX4D Hercules diesel. The units were secured from Big 3 Welding Equipment Company, Houston.

WEST Engineering Company, Houston, has bought from Houston Engine & Pump Company, of Houston, a model GD157 Continental diesel which will be used to drive an ac generator.

GULFPORT Shipbuilding Company, Port Arthur, Texas, is installing a series 71, 3-cylinder, model 3082, torque-converter equipped General Motors diesel in the dry cargo barge now under construction for Standard Oil Company.

ST. LANDRY Drilling Company, Eunice, Louisiana, has bought from Waukesha Sales & Service, Inc., of Houston, a model 195DLCU Waukesha diesel rated 76 hp at 2000 rpm.

HOUSTON Building Materials Company, Houston, will repower a Northwest dragline with a series 71, 3-cylinder, model 3030C General Motors diesel. The engine was furnished by Stewart & Stevenson Services, Inc., Houston.

BROWN & ROOT, Inc., general contractors of Houston, have bought from Big 3 Welding Equipment Company, Houston, two 300 amp Lincoln welding generators, each powered by a series 71, 2-cylinder, model 2055 GM diesel.

1957 OGP Meeting

The Oil and Gas Power Division of the ASME will hold its 1957 convention at the Kentucky Hotel, Louisville, Kentucky from May 20th through May 23rd. Ray Schakel will again be Exhibits Chairman, as he was for the 1956 meeting in New Orleans. All exhibit booth space was sold out in New Orleans, so there will be twenty additional booths for the 1957 meeting to take care of those who couldn't get space at, New Orleans.

Order forms for exhibit booths will be mailed in mid-August opening the sale of booth space. Space allotments will be made and announced in December to allow ample time for display planning. The 1956 OGP meeting was very well attended, and those who are planning to exhibit at the 1957 convention will do well to get their booth reservations in early to insure the best possible booth location.

For any information regarding exhibits contact Mr. Ray Schakel at the Diamond Chain Co., 407 Kentucky Ave., Indianapolis, Indiana.

Eastern Sales Representative

Dravo Corporation, Pittsburgh, has announced the appointment of Alfred D. Cox, Jr., as eastern marine sales representative for its Engineering Works Division, builders of river and harbor vessels, heavy materials handling equipment and chemical process equipment. Since 1942, Mr. Cox has served as an officer in the U.S. Navy. His most recent assignment, with the rank of commander, was head of the Mobilization Requirements Section, Office of the Chief of Naval Operations, Washington, D.C. A native of Wilmington, Del., Mr. Cox is a graduate of Swarthmore College. He will make his headquarters at the New York office of Dravo Corporation.

New General Manager

Clyde W. Truxell, former works manager of Detroit Diesel Engine Division of General Motors, has been appointed general manager of the Division. He succeeds Semon E. Knudsen who is now general manager of GM's Pontiac Motor Division.

Spanish Order For Engines

The White Diesel Engine Division announced recently it has received an order to produce 27 Superior diesel engine generating units for new U.S. Air Force bases in Spain. The engines raise to 42 the total ordered from the White Motor Company division for shipment to Spain. Earlier this year, the division received a Spanish order for 15 diesel pumping units to drive jet and diesel fuel through product pipe lines. Both orders are scheduled to be completed by December 1, 1956.

The power units, which will provide a total of 6,200 kw, are to be used as generating equipment in radar stations and in pipeline pumping stations linking various air bases. Contractor for the entire Spanish air base project is Brown-Raymond-Walsh of New York and Madrid. Sixteen of the generating units will be 392 hp Model 4OC-SX-6 diesels supplying 250 kw each. Six other Model 40C-SX-6 diesels rated at 292 hp and five Model 40C-S-6 engines rated at 290 hp will provide 200 kw.

All will operate on diesel fuel delivered in the same lines supplying jet fuel to the air bases. The 15 pumping engines will be 825 hp Model 40C-SX-8 diesels. They and 11 of the generating units will be installed at six pumping stations situated at varying altitudes.

STANDARD OF THE INDUSTRY SINCE 1936

Luber-finer

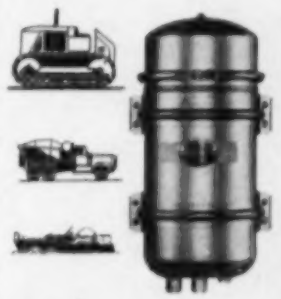
FOR EVERY TYPE OF ENGINE EVERY TYPE OF OIL

STANDARD and OPTIONAL EQUIPMENT ON LEADING DIESEL TRUCKS TRACTORS & STATIONARY ENGINES

Only a Luber-finer Filter Unit with a genuine Luber-finer Pack produces the patented filtering process that gives engineered protection to engine and oil as recommended by equipment manufacturers. The vital oil supply is circulated through Luber-finer's exclusive specially processed media which removes not only the injurious suspended solids from the oil but also the colloidal impurities which are often more damaging, thus increasing the life of both engine and oil. *The Efficiency of Luber-Finer's Patented Process has never been equalled!*

Luber-finer's patented filtering process adds thousands of miles to engine and oil life—cleaning—filtering—and returning the oil to the engine with the excellent lubricating qualities as specified by the manufacturers of today's modern high powered engines. Every minute—every mile your engine is run it must be protected.

Remember, there's a Luber-finer model especially designed for your type of engine or oil.



DON'T BE MISLED! ONLY GENUINE LUBER-FINER PACKS GIVE EXCLUSIVE ENGINEERED PROTECTION

DIESELPAK — Designed for use with H.D. detergent compounded oils. May also be used with fuel oils and straight mineral oil. Removes impurities and contaminants—without affecting the additives.

REFINING PACK — Designed for use with straight mineral oils, fuel oils, hydraulic oils and inhibited industrial oils.

The Refining Pack, which combines ABsorbent with ADsorbent filtration, removes acids, moisture, suspended particles and colloidal impurities during its effective life more efficiently than any other filter.

WRITE FOR COMPLETE INFORMATION DEPT. 6

LUBER-FINER, INC. 2514 S. Grand Ave., Los Angeles 7, Calif.

Mid-West Diesel News

By **L. H. Houck**

MACK TRUCKS, Inc., has opened a factory branch for Mack trucks, diesel engines, Mack buses and fire apparatus at 1116 Campbell St., Kansas City, Mo. Opening of this big, new branch represents one move in Mack's aggressive program all over the country.

FRANCE STONE CO., Toledo, Ohio, has repowered a Marion 470 shovel with a 275 hp NHIS-600 Cummins diesel from Cummins Diesel Michigan, Inc., Detroit.

POND CONTRACTOR and terracing expert, Albert Balkenbusch at Linn, Mo., has added a Caterpillar D6 to his equipment spread. It is equipped with hydraulic dozer with No. 46 control.

DIESELIZED EQUIPMENT is plentiful on the second Oklahoma Turnpike, which starts at Tulsa and ends at Joplin, Mo., 88.5 miles, for a cost of $68 million. Sixty contractors are working and all have heavy diesel equipment. This section of the Oklahoma Turnpike which begins at Oklahoma City and runs to Tulsa is known as the Tulsa-Joplin Turnpike.

LYONS COUNTY and Osage County, Kansas, have each accepted delivery on an Allis-Chalmers AD-45 motor grader from Newlin Machinery Corp., Kansas City, Kan., equipped with the new diesel made by A-C's Buda division. The new grader will be used in county road work.

NEW DIESEL EQUIPMENT in the $7 million expansion program of the Wabash Railroad Co., includes 9 diesel locomotives, according to Arthur K. Atkinson, president, who made the announcement at a stockholders' meeting in St. Louis.

TULSA-JOPLIN Turnpike contractor, E. E. Barber Construction Co., Fort Smith, Ark., who has a $1,212,998 contract, is using a new Link-Belt Speeder with a Caterpillar D318 engine on twin bridge spans over the Verdugris River.

SOUTHERN STATES Paving Co. is operating a hot mix plant near Lawrenceburg, Tennessee with a Murphy diesel electric generating set. R. C. Dewberry, plant foreman, said he is turning out 1200 tons of hot mix per 14-hour day with engine running at about two-thirds load.

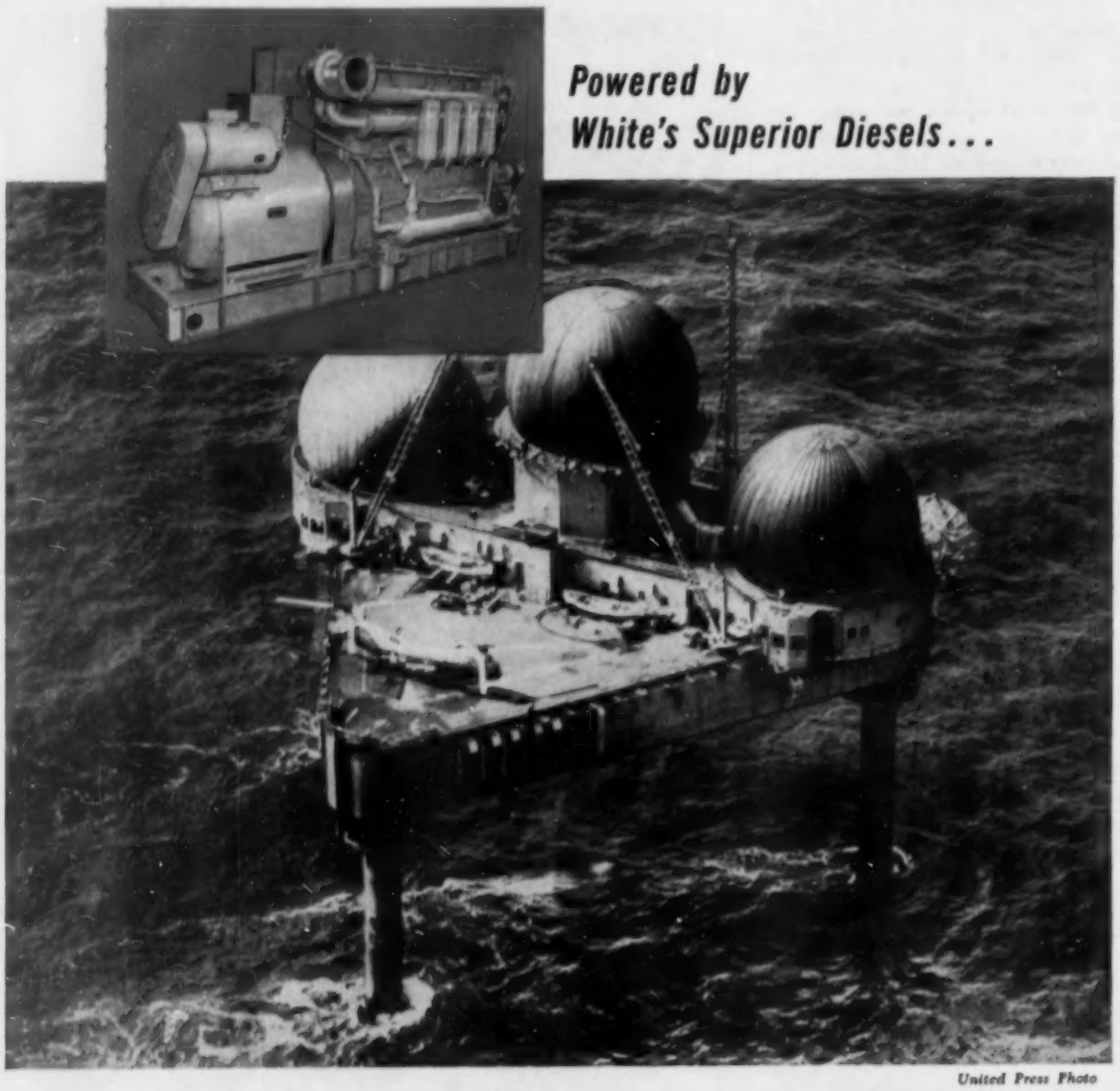
SAWMILL operator A. L. Bressler, Winona, Mo., has installed a 110 hp HRP-400 Cummins diesel. Delivery was made by Cummins Missouri Sales Corp., St. Louis.

FABICK & CO., Jefferson City, Mo. has delivered a Caterpillar No. 12 grader to Davis Construction Co., Boonville, Mo., for use in general highway contracting.

E. A. MARTIN MACHINERY CO., Caterpillar dealer with main office in Joplin and branches in Springfield, Mo., and Harrison, Ark., has delivered a Caterpillar D9 to Snyder Construction Co., Joplin, with dozer equipment. The same company has ordered three Caterpillar DW-21 tractors and 25-yd. scrapers.

GIBSON & BOWLES, Lees Summit, Mo., conservation and terracing contractors, have bought an Allis-Chalmers HD-16 with Twin Disc torque converter from Newlin Machinery Corp., Kansas City, Kan.

WILSON TRUCK Co., Nashville, Tenn., has started one of the ~~largest~~ changeovers in the trucking industry with the purchase of 150 Model B65T Mack diesel tractors and delivery of the units has begun. They will be used in



United Press Photo

TEXAS TOWERS' WARNING WILL ALERT OUR NATION

This U. S. Air Force early warning radar station off the coast of Cape Cod is called the Texas Tower. Aboard the Tower, radar eyes search the skies. In the event of approaching enemy bombers, a push of one red button will warn our coastal areas and start our air defense into action!

Two more Towers are now being built for the U. S. Air Force by the U. S. Navy, to be a vital part of our nation's far-reaching radar air defense system. They require high-quality, heavy-duty equipment giving dependable performance with minimum maintenance over long periods of continuous service. White's Superior Diesel engines meet these requirements . . . they have been selected to generate the power for the vital radar operations, and also for the radio, communication, heating, lighting and ventilating equipment aboard the additional Towers.

If you require rugged, heavy-duty, high-quality Diesel engines for the most dependable and economical operation, choose White's Superior Diesels. There's a size and type for virtually every requirement from 215 to 2150 horsepower, or 150 to 1500 KW. Get complete information now.

Superior ENGINES ATLAS Imperial DIESEL White DIESEL

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY *Plant and General Offices: Springfield, Ohio*

the runs from Atlanta, Ga., to St. Louis, and Kansas City with stops only to change drivers and take on fuel. Completion of its program will make it a 100 percent diesel fleet.

SOME OF THE DIESEL equipment in use by J. W. Moorman & Sons, Muskogee, Okla., on the Tulsa-Joplin Turnpike, includes a Caterpillar D9, a fleet of 13-yd bottom dump Euclids with GM diesels, a Euclid 7BV belt loader with GM. Loader is pushed with an International TD-24. An Allis-Chalmers HD-15 pulls tamping rollers and an Allis-Chalmers TS-200 scraper with AC (Buda) diesels helps move dirt.

NEW CUMMINS outlet has been opened in Boise, Idaho, with the purchase of Cummins Diesel Sales Corp., by Raymond L. Schwartz, Twin Falls, who organized a new company, Cummins Idaho, Inc.

RENO CONSTRUCTION CO., Overland Park, Kansas, has taken delivery on two HD-11 Allis-Chalmers tractors from Newlin Machinery Co. Reno does a big volume of pond and terracing work.

NINE NEW MACK distributors have been appointed in its sales expansion program. They are: Astabula Truck Sales & Service, Astabula, O.; Bulldog Trucks, Inc., Redding, Calif.; Burns Mack Sales, Clearfield, Pa.; Harris Motor Car Co., Cape Girardeau, Mo.; Hastings Motor Truck Co., Hastings, Neb.; Holman Motor Co., Inc., Mt. Vernon, Ill.; Reno Equipment Sales Co., Reno, Nev.; Snowden Mack Service, Inc., Beaumont, Tex.; Texarkana Mack Sales, Texarkana, Ark.

STERLING Excavation & Erection Co., Jefferson City, Mo., have a new Caterpillar with No. 955 Traxcavator with a 1½ yd bucket 80 in. wide, from Fabick & Co.

JOHN RIGGS, JR., president, Riggs Tractor Co., Caterpillar dealers with branches in five Arkansas cities, has been elected president of the Southern Caterpillar Dealers Association at the April meeting in Atlanta. Dealers in 9 states belong.

INDIANAPOLIS-KANSAS CITY Motor Freight Lines have installed a 175 hp JT-6-B Cummins diesel in a GMC Model 630 tractor. Cummins K. C. Diesel Sales Corp., Kansas City, handled the job.

Generator Brochure

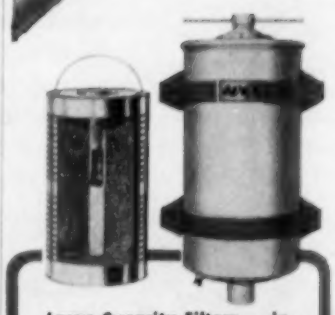
Kato Engineering Company, Mankato, Minnesota, has available a new brochure covering their new 400 kw, 500 kva, 60-cycle generator series. Copies are now available. Write Dept. r-c, Kato Engineering Company, Mankato, Minnesota.

Torque Converter Bulletin

Series 13,800 Twin Disc Three-Stage Torque Converter, is the title of Bulletin No. 507 just released by Twin Disc Clutch Company. The new 13,800 Series Converter expands the Twin Disc line to include every hp range from 40 to 1,000. Features of the new converter include simplicity of design, one standard output shaft assembly, and three input arrangements. Illustrations and charts explain the construction and application of the new 13,800 Series Converter. A copy of Bulletin No. 507 may be obtained by writing directly to Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois.

NOW AVAILABLE! The Completely new Volume 21 of DIESEL ENGINE CATALOG. This giant, fully illustrated reference book containing complete and detailed engine and accessory sections is bigger, better than ever before. Mail orders are now being filled for this "Bible of the Industry," which has been revised, rewritten and brought up to date completely from cover to cover. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company order forms to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

THAT MEASLY LITTLE GRIT . . .
Can and Does Chew Up Diesel Engines



Large-Capacity Filters — including the WF-750 Bar-type cover handle for heavy duty applications. Eliminates troublesome cover bolts, speeds cartridge changing.

Sock and Can-type Cartridges for Fuel and Lube Oil filtration.

Your choice of many outstanding Filtrants engineered to give you prescription-type Cartridges for your particular operating conditions.

Peak dirt retention capacity built into every Filtrant—giving you longer intervals between Cartridge changes and higher filter efficiency throughout the life of every Cartridge.

WIX makes a "big production" out of a little destruction . . . but that "little destruction" can chew up *your* dollars *fast!*

Contamination in fuel and lubricating oil is a continuing problem—affecting construction equipment, trucks and buses, marine, railroad and stationary engines. The service life and performance pattern of your Diesel engines is directly related to the cleanliness of fuel and lube oil.

WIX Oil Filter Cartridges are the product of objective research and engineering. They do a superlative job of keeping oil clean — give you a solid form of insurance against excessive downtime, maintenance cost and engine wear.

Write today for the complete WIX Catalog of HEVI-DUTY Cartridges for Fuel or Lubricating Oils . . . or for the assistance of WIX Filtration Engineers.

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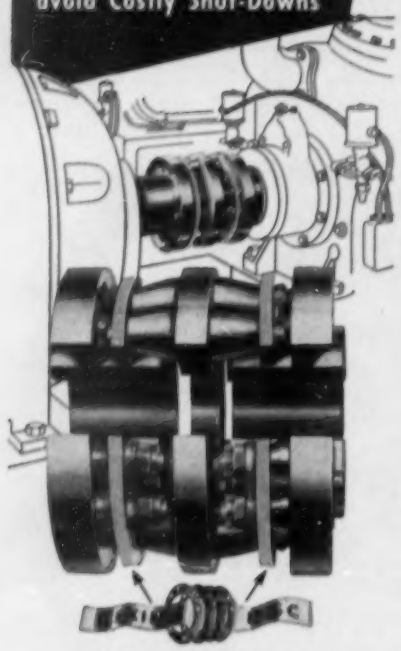
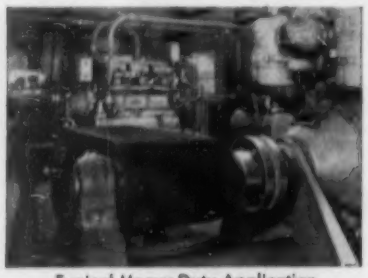
CARTRIDGES OIL FILTERS
AUTOMOTIVE • INDUSTRIAL • RAILROAD
WIX CORPORATION • GASTONIA • N. C.
In Canada: Wix Accessories Corp. Ltd., Toronto

Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



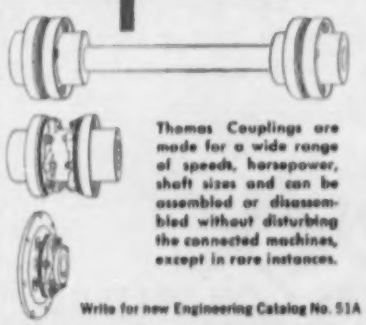
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



Typical Heavy Duty Application on Multiple V-Belt Drive

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Tuna Clipper for Western Waters

Another new tuna clipper from the yards of National Steel and Shipbuilding Corporation joins San Diego's expanding fishing fleet. Christened the *Elsinore*, it is the seventh in National's current series of high speed, steel vessels designed specifically for western fishing conditions. Honored guests for the launching included the Honorable Thomas H. Kuchel, United States Senator from California and Captain F. L. Ruhlman, Commanding Officer, U.S. Naval Repair Facility. Miss Patricia Louise Giddings served as Sponsor with Mrs. F. Arthur Heilbron as Matron of Honor.

Brief specifications of the *Elsinore*:

Length, Overall ..... 127 ft
Beam, Moulded ..... 30 ft 6 in.
Depth, Moulded ..... 14 ft 6 in.
Total Fish Capacity ..... 340 tons
Total Fuel Capacity ..... 48,551 gallons
Fresh Water Storage ..... 4,000 gallons
Lubricating Oil Capacity ..... 1,600 gallons
Crew's Quarters (Including Captain's) ..... 15 men

Main Engine: Fairbanks-Morse 960 hp Model 38D8⅛, 6 cylinder, 720 rpm, opposed piston, direct reversing, Marine propulsion diesel engine. Furnished with reduction gear with a 3:1 ratio, rated at 960 hp at 720 rpm.

Auxiliary Engines: Murphy Diesel, Model 24, 6 cylinder, 4-stroke cycle, 6⅜ in. bore, 6½ in. stroke, developing 191 hp for continuous duty service at 1200 rpm.

Generator: Electric Machinery Mfg. Co., 6-pole, 125 kw at .80 pf, 156 kva, 240 volts, 3 phase, 60 cycle, 3 wire, 1200 rpm, single bearing.

Refrigeration Plant: Four Worthington 6 in. x 6 in. ammonia compressors each driven by a 30 hp electric motor.

Steering: The Sperry Magnetic Compass Pilot provides automatic and manual steering, driving through a National Steel Worm gear unit.

Air-Cooled Diesel for Drilling Rig

A new oilfield application for a European diesel engine has been announced by Ideco, One of the Dresser Industries, Dallas, Texas. A 12-cylinder, 250 hp, air-cooled diesel engine built by Deutz in Cologne, Germany, has completed extensive operational tests as a dual-purpose power unit for Ideco's self-contained servicing and workover rig—the Drive-In Rambler. This mobile 4-axle rig combines a double-drum Hydrair Hoist, 95-foot guyless mast, engine and driver's cab on a single self-propelled carrier which operates much like a modern truck. The Deutz engine provides power for rig operation is well as propulsion at highway traffic speeds. A General Motors torque converter and an Allison three-speed transmission provide a wide range of speed and torque for pulling a heavy string of pipe out of the hole, climbing steep hills, or covering more than 350 miles in a single day.

Among the features of the air-cooled diesel contributing to its economical operation are its relatively light weight for horsepower and its higher cylinder wall temperatures. With no radiator, water jackets and other items necessary for water cooling, the 250 hp Deutz engine weighs less than 2800 pounds including accessories. Maintenance of the Deutz engine is simplified because of its unitized construction. Each cylinder, with its separate head, may be removed and replaced independently. Cylinder units, pistons and rods are interchangeable within the same engine and between other Deutz engines of various sizes. Ideco has been appointed exclusive Deutz representative to the world-wide petroleum industry. Parts and service headquarters are centered in Ideco's Beaumont, Texas plant.

Turbo-Dozer at Work

The Michigan Turbo-Dozer shown above is being used on the new Florida turnpike under construction in the eastern part of the state. It is powered with a model 135 DKBS turbocharged Waukesha diesel engine with a max. hp of 165 at 2200 rpm. It has a Clark Industrial 3.0 to 1 multiplication ratio torque converter, a hydraulic lift and tilt cylinders as well as hydraulic steering as part of its assembly. It is the first one in Florida and the new Sunshine State turnpike construction job is giving it a good trial.

Traction Type Fluid Drive

A new improved traction type Gyrol Fluid Drive for general industrial application is now available from American Blower Corporation, Detroit 32, Michigan. Designated Size 126 Type T, the basic unit is designed for industrial use with internal combustion engines as a fluid power transmission for mobile material handling vehicles and construction equipment. Power rating in these applications is 25 to 85 hp, depending upon drive speed. The new fluid drive is of die-formed, resistance-welded construction. The runner and impeller assemblies ride on two ball bearings which take the internal thrust of the unit, making the entire fluid drive a rigid assembly. Both bearings are readily accessible for inspection and maintenance.

The oil seal used in the Size 126 unit consists of a carbon ring riding on a Meehanite iron ring, lapped to a close tolerance to give a flat surface. All O-rings are fabricated of an oil-resistant silicon rubber which is recommended for high temperature service. The entire fluid drive is dynamically balanced following final assembly to assure smooth running conditions at operating speed. Dimensions for the basic unit are 7⅛ in. over the shaft and 14⅛ in. outside diameter. Like other Gyrol Fluid Drives, the new Size 126 provides shock isolating, smooth starting and torque limiting characteristics for a variety of industrial drive applications. Installation is simple for internal combustion engine mounting arrangements.

Original Equipment Sales Manager

Harold D. Cupitt has been named manager of original equipment sales, air filter division of the Dollinger Corporation, Rochester, N.Y. He was with Air-Maze Corp. for three years before joining Dollinger.

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Alco Names Consulting Engineer

R. Tom Sawyer

Appointment of R. Tom Sawyer as a consultant on engineering and development problems has been announced by Alco Products, Inc. The appointment became effective July 1. Sawyer had been the company's research manager since June, 1953. In addition to his Alco duties, Sawyer will become a consultant to the staff of the Experimental Towing Tank at Stevens Institute of Technology, Hoboken, N.J. There he expects to work on various Army development projects. Well known in engineering circles, Sawyer joined Alco's predecessor, the American Locomotive Company, in 1930 as a sales engineer on diesel locomotives, and he held that position until 1941. From 1941 to 1947, he was a diesel equipment engineer for Alco, working on numerous research and development problems concerning diesel engines, electrical equipment and gas turbines. In June, 1947 Sawyer was appointed manager of Alco's research department in New York City, working on diesel engine and gas engine turbine developments, as well as nuclear power activities. In addition, he was responsible for all Alco contact with various engineering and professional societies.

Sawyer was named manager of research in June, 1953 and moved his offices to Schenectady for closer coordination with the company's locomotive-building activities. An alumnus of Ohio State University, where he received a bachelor of science degree in electrical engineering, and also a degree in mechanical engineering, Sawyer joined the General Electric Company upon graduation in 1923. There he worked as an electric and diesel-locomotive service engineer in both the United States and Australia prior to joining Alco. He is a member of the American Institute of Electrical Engineers; Society of Automotive Engineers; American Rocket Society, having served as a director from 1949-1951; New York City Engineers' Club, and the American Society of Mechanical Engineers. He helped organize ASME's gas turbine division in 1947 and served as its first chairman from 1947 to 1949. He also belonged to the former Steam Locomotive Research Institute which was dissolved in November, 1952; and is a member of the Diesel Engine User's Association, London, England; Franklin Institute, Philadelphia and American Nuclear Society. In addition, Sawyer is a registered professional engineer in New York and New Jersey.

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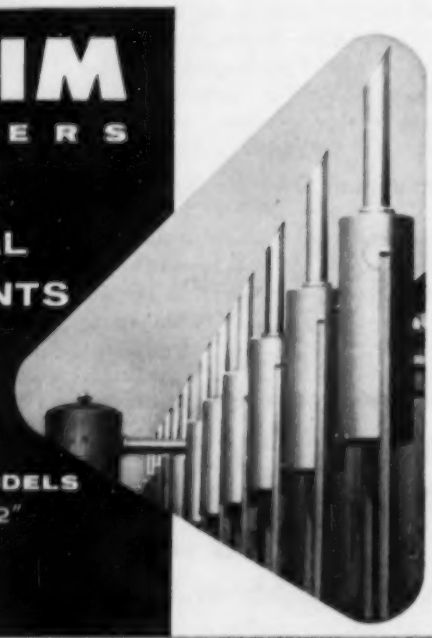

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Full Flow Filter Cartridges

Briggs new replaceable filter cartridges are designed for full flow engine lubricating and fuel oil applications and other applications where extremely high flow rates are desired. They are being nationally marketed in sizes to fit almost any commonly used industrial or automotive filter case, and have found use among transportation and industrial manufacturers, as well as in the marine, construction equipment, and fleet automotive fields. These new cartridges consist of special resin impregnated paper, cured at high temperature, and formed into uniform layers providing a microscopically fine filter media, accordian pleated to multiply the effective area of filtration. The cartridges are secured to a perforated metal center tube designed to withstand high differential pressure. Ends are securely anchored to top and bottom plate with a cork gasket on each end to give perfect seal and strength when cartridges are stacked one upon the other. The cartridges are wrapped in a covering of treated paper to protect the pleated paper. No parts are required for initial installation. High flow rate, low pressure drop and fine particle selection are basic characteristics. They do not remove the additives found in many petroleum products, and the waterproof paper makes them suitable for water emulsion coolants. Designed for 98% plus initial removal of particles 15 microns and over as found in approved test dust, filtration will be progressively finer as accumulated solids increase filtration efficiency.

These cartridges have been found satisfactory for filtering water soluble machine tool coolants; coolant and cutting oils; fuel oils—gasoline, aviation gasoline, kerosene, JP-4, JP-5, and #2 diesel fuel; lubricating oils; hydraulic oils; synthetic hydraulic fluids; anti-freeze compounds, such as ethylene glycol; ethyl alcohol; lacquer thinner; ethyl acetate; butyl alcohol; xylol; high and low K.B. mineral spirits; naphtha and tuluol. Specific, detailed information may be obtained by writing to this publication or to The Briggs Filtration Company, Washington 16, D.C.

District Sales Representative

E. C. Schum

The Amot Controls Corporation, Richmond, California manufacturers of thermostatic valves, automatic engine shut-down devices and temperature switches, has announced the appointment of E. C. Schum as district sales representative in Southwestern Ohio, Southern Indiana and Kentucky. Mr. Schum was formerly diesel engine sales manager of the Baldwin-Lima-Hamilton Corporation (Hamilton Division). He is a graduate of Cornell University in mechanical engineering and a resident of Hamilton, Ohio.

Receives Award

Left to right: Dr. John C. Warner, William C. Dunn, Dr. W. Trinks.

William C. Dunn, Chairman of the Board and co-founder of The Ohio Crankshaft Company, has received the coveted Trinks Award for fostering the growth of induction hardening and vastly increasing its scope and usefulness. Mr. Dunn, who developed the basic patent for induction hardening of crankshaft surfaces, was one of four leading industrialists to be recognized in the national industrial heating competition. Since pioneering the first Tocco induction heating unit for crankshafts in the mid-30's, Mr. Dunn has played a leading role in the development of induction hardening equipment and techniques for forging, annealing and brazing of a wide variety of components for almost every segment of industry.

Dry Grinder Head and Manifold Jig

A new roll-over jig designed to make possible the set-up and dry grinding of both block face and manifold face of new V-8 heads is now available. The fixture carries the workpiece over the grinding wheel on a tripod of 3 sealed rollers. A product of Peterson Welding Laboratories, Inc., the new jig works with all types of dry grinders. Its roll-over feature permits a fast accurate handling of even latest valve-in-head V-8's, which require that the intake manifold face of the head be ground each time .010 or more is removed from the head's block gasket face. Unless both intake manifold face and block gasket face of these heads are ground, the manifold will not fit up properly. Also misalignment of intake ports will result causing burbles and turbulences. Illustrated literature is available on request from Peterson Welding Laboratories, Inc., 1423 Virginia, Kansas City, Mo.

Engine Sales Manager

J. C. Baseheart is Engine Sales Manager, and F. M. Borwell is Assistant Engine Sales Manager of the Buda Division, Tractor Group, Allis-Chalmers Mfg. Co., with headquarters at the home office in Milwaukee, Wis. Baseheart was formerly in charge of engine sales and Borwell was special district representative, engine sales, for the Buda Division, Harvey, Illinois.

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Important events break first in DIESEL PROGRESS, because the editorial staff is made up of men strategically located all over the country—men with real diesel "know-how."

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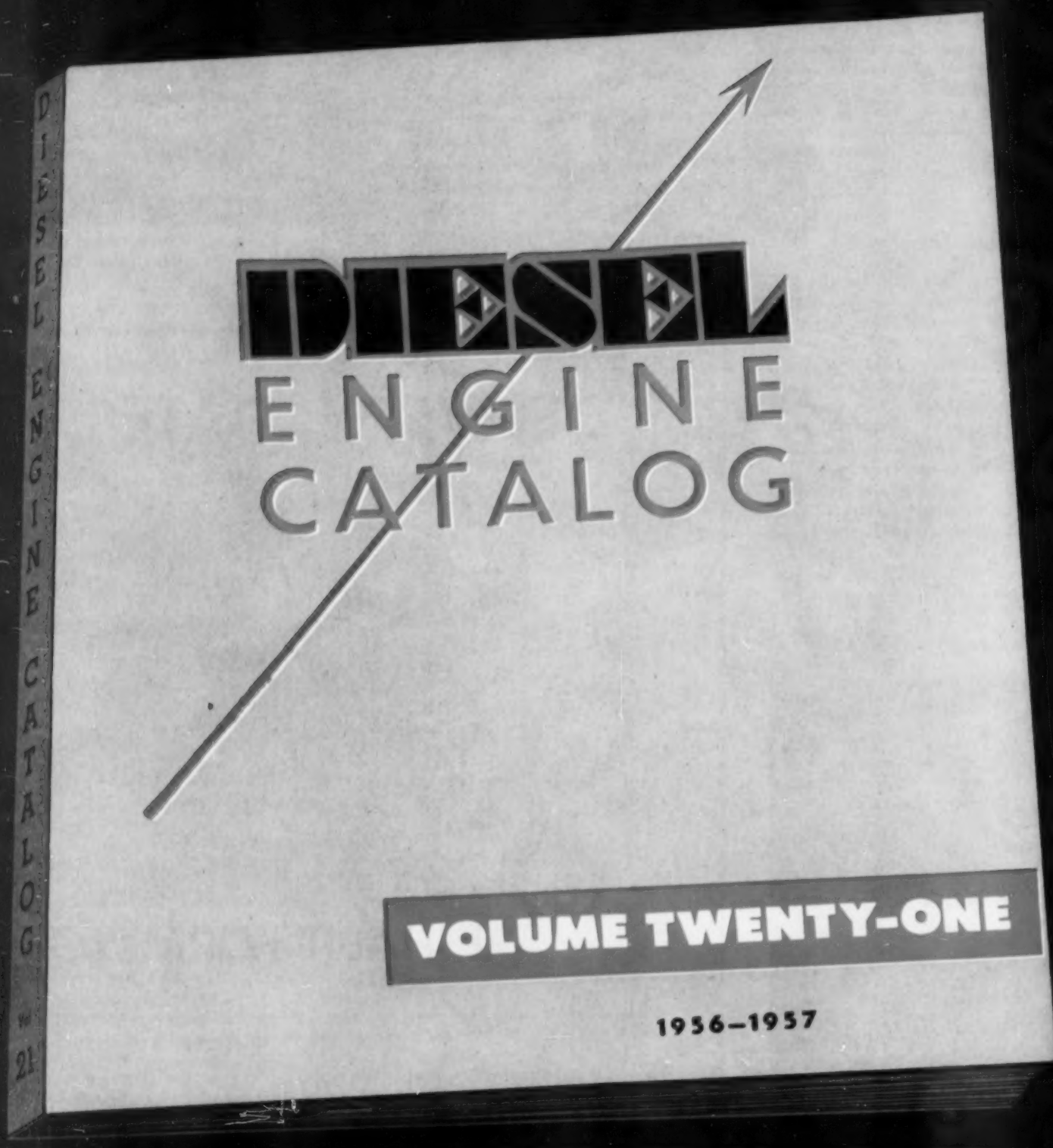

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Diesel Dredge Authority Retires

Mr. Christian Cox, seventy-one years young and one of the country's leading and well known authorities of dieselized dredges, recently retired from the Auto Marine Engineers Inc. of Miami, Florida, as consulting engineer. Pop Cox, as he was affectionately known throughout the dredging profession, started in the dredging industry at the age of 12, as a mess boy, in Galveston, Texas for the Bowers Southern Dredging Co. Coming to Florida in 1911, he helped dredge most of the present filled in sections of the Florida coast line, canals and rivers.

Shortly before WW II, he was sent to Greece to supervise the construction of five dredges costing 7 million dollars. The dredges were seized by Hitler and Pop Cox left just one step ahead of the Nazi legions. During the war, he was superintendent of dredging at the Charleston (So. Carolina) Navy Yard. For the last ten years, Pop has served as a consulting engineer at Auto Marine Engineers Inc.

Filter Cartridge For Mineral Oils

Hilliard Corporation of Elmira, N.Y., has announced a new filter cartridge for straight mineral oil filtration. The new filter cartridge features heavy steel bail, which will not come apart when removing exhausted filter cartridge, gaskets permanently attached to cartridge heads, steel heads to shield both ends of a cartridge against erosion of filter material, Hilite filtering media, which is a processed Fullers earth from very high grade deposits being water-resistant, calcined and retaining its original granular structure without turning to mud or a slurry upon contact with water, steel center tube extra heavy to withstand pressures with no vertical or radial collapse, heavy felted fabric over steel center tube to avoid migration of filtering material, heavy fabric tube, which resists erosion, and an expanded metal shield over the heavy fabric tube, open area 85% to obtain full benefit of surface for filtering.

The Hilite filtering media is vibrated into the cartridges for uniform density and tightness to avoid channeling, removes solid matter by absorption, and restores color to oil and removes acid by absorption resulting in a fine degree of filtration. Bulletin F-152-1 describes this filter cartridge which is available in various sizes for use in Hilco filters presently installed in the field, and also in new units manufactured by the company for using these filter elements. For further information write to Hilliard Corp. or to this publication.

New 200 Horsepower Motor Scraper

Allis-Chalmers has introduced its new TS-260 Motor Scraper, a 200 hp unit weighing approximately 39,600 pounds. It is powered by a 6 cylinder Allis-Chalmers diesel engine. The 14 cu yd heaped capacity and 11 cu yd struck capacity of the TS-260 is rated for high production in this medium sized motor scraper. With the power of the Allis-Chalmers diesel engine a high yardage to horsepower ratio is maintained. Another value of unit performance is the favorable horsepower to gross weight ratio built into the unit. These two ratios point to the proper balance between horsepower, capacity and weight built into the TS-260 and are evidence of power plus, to move full loads, give fast acceleration and ample reserve power.

Other design, engineering, construction and operating features add further to the TS-260's performance and long life. A hydraulic pump, gear driven from the rear of the engine crankshaft, provides positive drive and assures constant live power for steering and scraper operation. The curved bottom and three piece cutting edge with offset center edge gives faster penetration and better loading with live action. Positive forward ejection plus high apron lift provides fast clean spreading. Among features designed into the new scraper are selective hydraulic steering which provides two-speed steering by action of a steering control valve that is actuated from the wheel by direct linkage. A 30-degree turn of the steering wheel right or left directs full hydraulic power to double acting steering jacks for fast, accurate full 90 degree steering. When a slower turning action is desired on fast hauls, a slight turn of the steering wheel permits a regulated flow which provides slow, smooth response. This results in unusual maneuverability.

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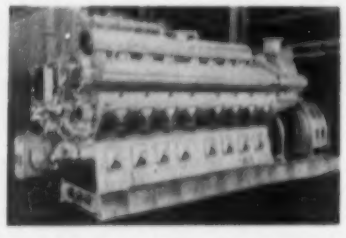

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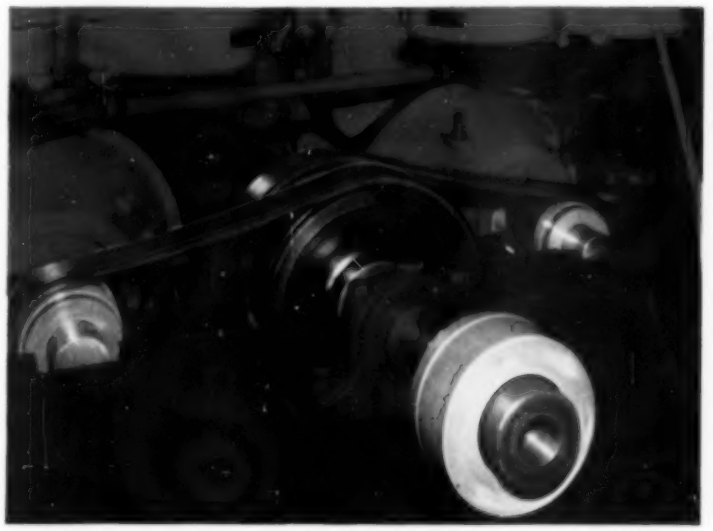
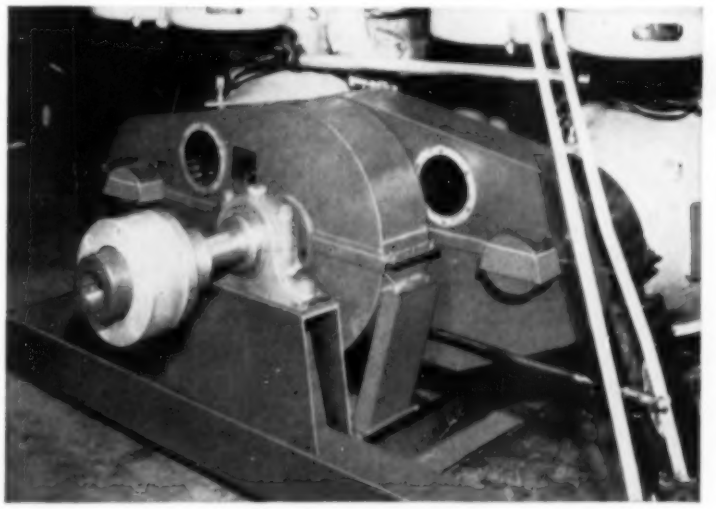


Note the smooth action of Morse HY-VO in operation. Matched 182-HP diesel engines, operating at 1450 RPM, are twinned through HY-VO Drives to jack shaft, which operates at 650 RPM. Jack shaft delivers 364 HP to load shaft (not shown), to which it is coupled with Morse Morflex Radial Coupling (see below).



Twin HY-VO Drives are encased in sealed casings, permit continuous forced-spray and sump oil lubrication. Observation ports permit inspection. Morflex Radial Coupling cushions any shock loads from driven unit, prevents engine pulsations from entering driven shaft.

Southern Bearings Service and Lewis-Diesel Engine Company solved difficult cotton gin drive problem at low cost to customer.

Morse Hy-Vo Drives helped solve a typical power-transmission problem for Lewis-Diesel Engine Company (Memphis, Tennessee). Working with Southern Bearings Service, Inc., the local Morse distributor, they combined twin high-speed diesels with two Morse Hy-Vo drives to get low-cost, low-speed, high-horsepower output to a cotton gin main drive.

By compounding two small, high-speed diesel engines with required reduction ratios, the need for a big, expensive, low-speed engine was eliminated. Quick access to individual drive units was made possible without disturbing main compound base. Customer downtime is reduced to a minimum.

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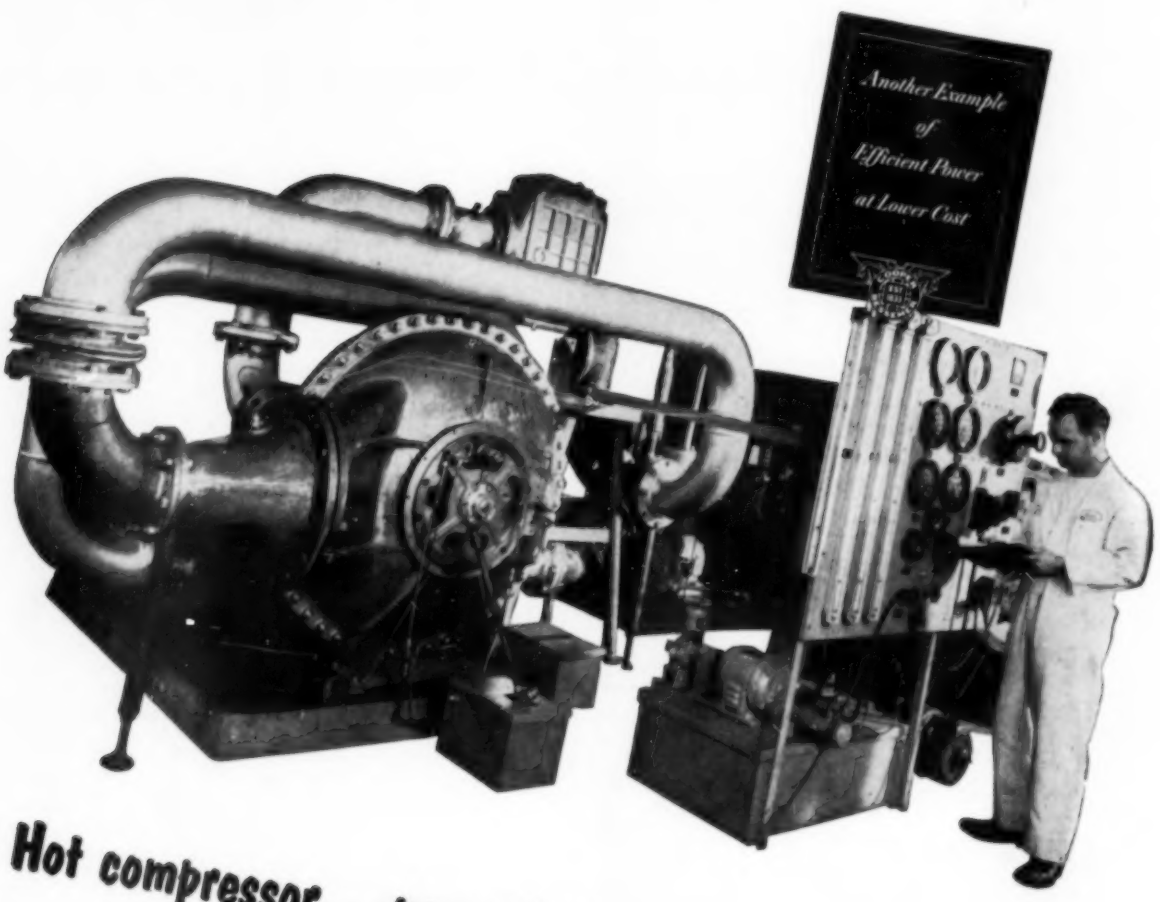

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PRAISE be, American industry is always on the go—always working out new and better ways to do things. A good example is today's incredible chemical and petrochemical industry. As in most other industries, new processing techniques have posed new problems. One is how best to handle the huge-volume compressing of gases and air. And that is a field in which Cooper-Bessemer has a 100-year stake.

Shown above during test stages is one of Cooper-Bessemer's latest answers—a highly efficient, remarkably compact, multi-stage *centrifugal* compressor, that can be driven by electric motor, internal combustion engine or turbine. These space-saving compressors will help solve many new problems of industry; are already in phases of government service.

Although such centrifugal compressors are new in application, they are not new in Cooper-Bessemer experience. Here work on rotating compressor equipment has been under way for years . . . anticipating these very problems . . . and the answers.

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